Volume 13, No. 3

May, 1958

Biltmore Estate

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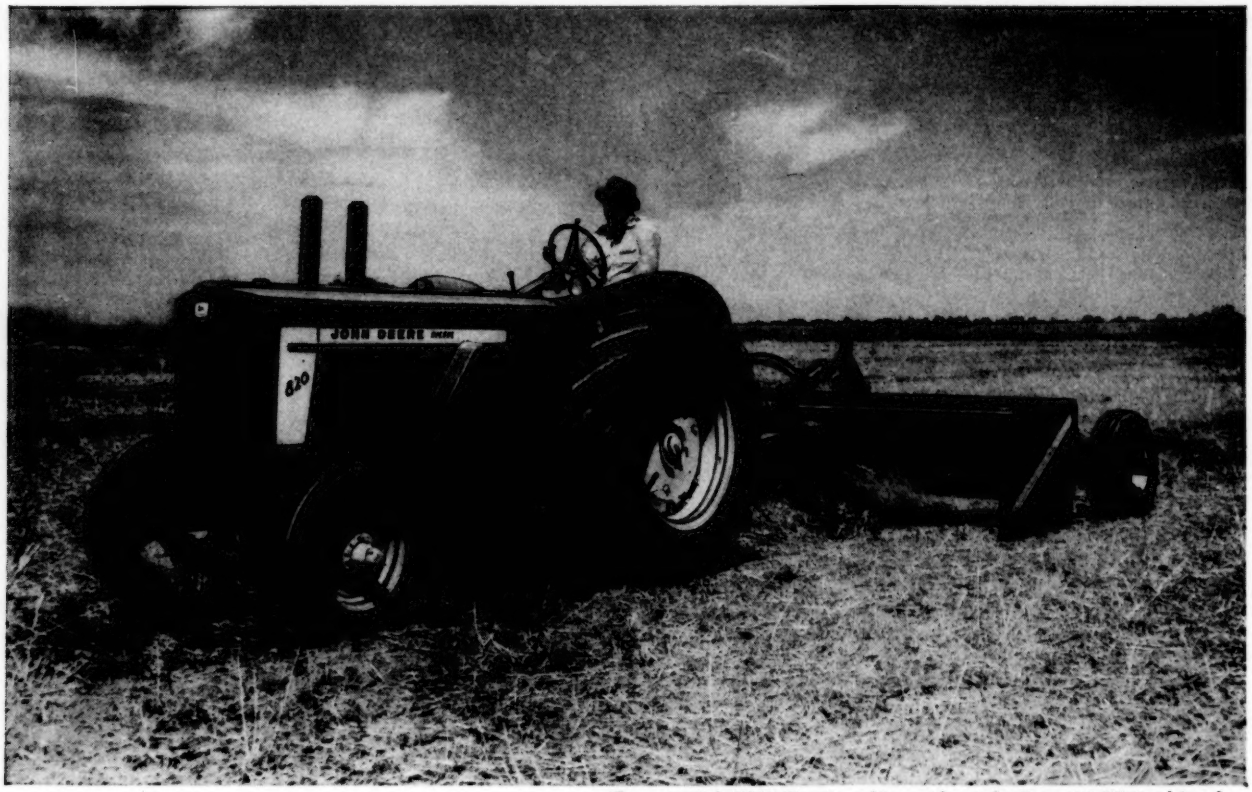

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Journal of SOIL AND WATER CONSERVATION

VOLUME 13
NUMBER 3

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COVER: Dan Todd of the U. S. Forest Service captured "spring" in the Linville Gorge Wild Area of the Pisgah National Forest in North Carolina. We aren't too sure, but doesn't the fisherman look like an ardent "soil conservationist" you know? It's Saturday, of course, and he's enjoying the product of good watershed protection.

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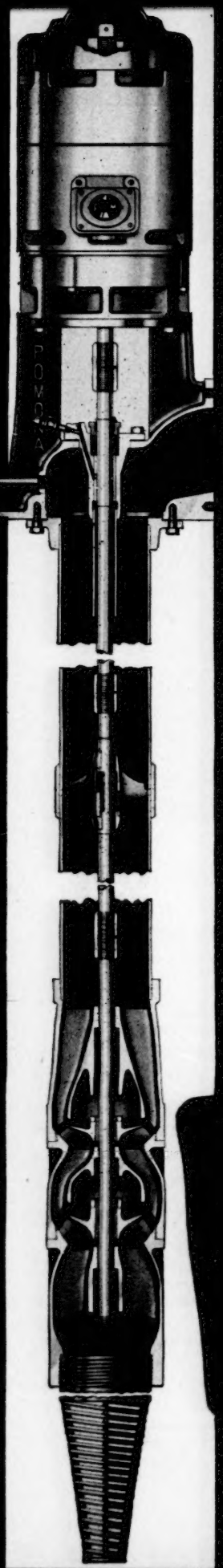

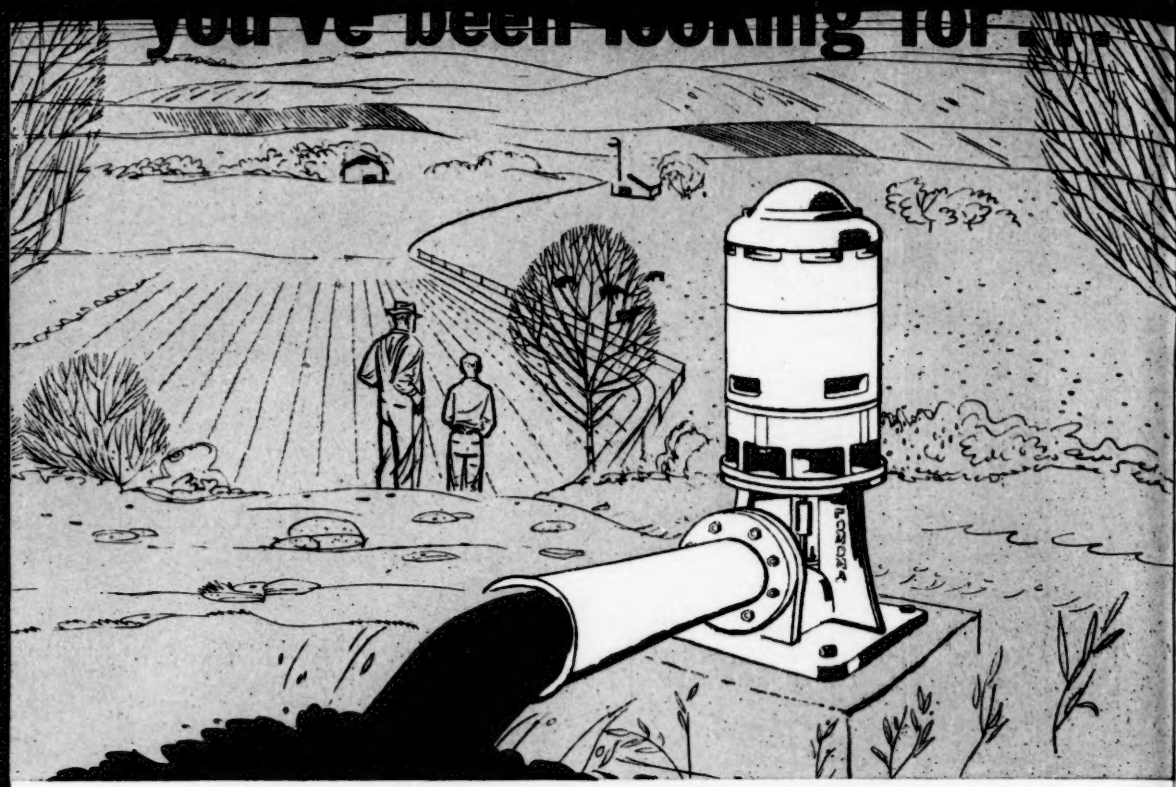

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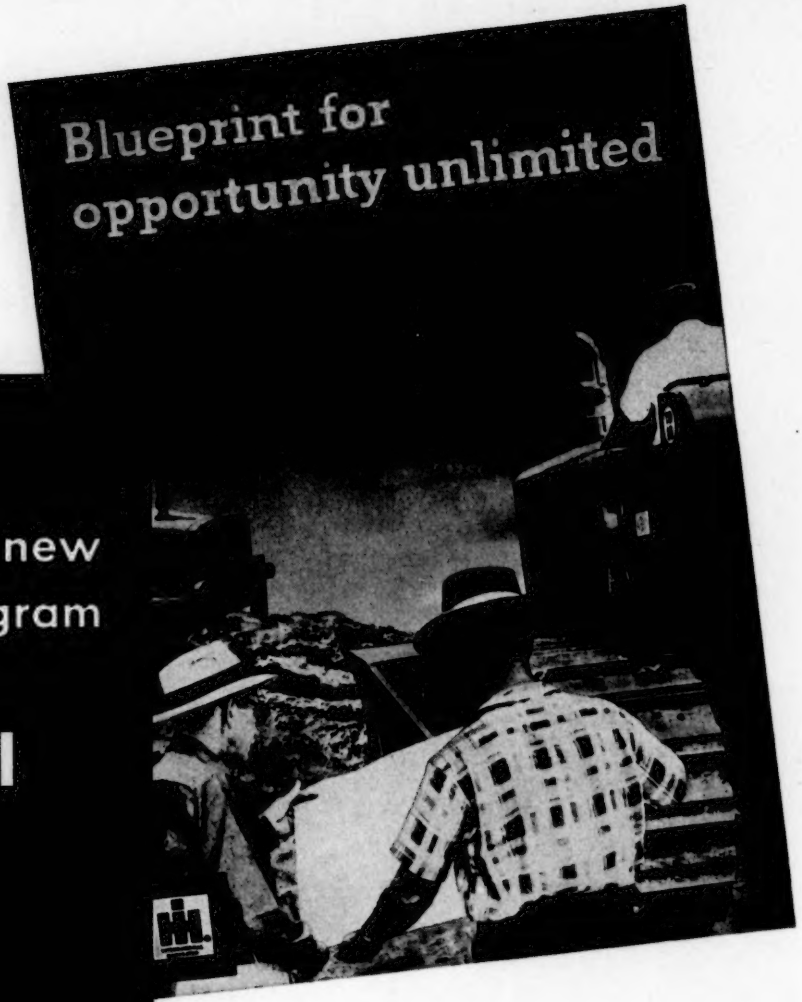

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Biltmore Estate—Cradle of Conservation in America

C. R. PATTON

Biltmore Estate, which will be visited by delegates to the Soil Conservation Society of America convention, Asheville, North Carolina, in October, 1958, is famous for many things—Biltmore House, the grounds and gardens, and the scenic beauty of the estate and the majestic mountains surrounding it. Most famous perhaps is Biltmore House, completed in 1895 after five years of intensive construction at a cost of five million dollars, with its priceless furnishings of antique furniture, ancient tapestries and paintings. Also famous are the grounds which were planned and landscaped by Frederick Law Olmsted, designer of Central Park in New York City; and the Biltmore herd of some 1,200 purebred Jerseys, one of the largest and finest in the country, which annually produces some 3½ million pounds of milk.

NOT SO WELL KNOWN is the fact that Biltmore is indeed the *"birthplace of forestry and cradle of conservation in America."*

The first woodland in the United States to be put under a regular system of forestry management was on Biltmore.

The first forestry school in this country was established at Biltmore in 1889. At that time, forestry in the United States was no more than a theory, with only two foresters in the country, both European trained. In the fifteen years that the school was in operation, some 200 young men—men who to become leaders in the world's first great concerted conservation movement—received their training and inspiration at Biltmore.

Biltmore Estate was created by the late George W. Vanderbilt, on 7,500 acres of rolling intermountain hills on the banks of the French Broad and Swannanoa Rivers in Buncombe County, just a stone's throw from the city of Asheville. Vanderbilt set out in the early nineties to create the most beautiful and elaborate country estate in America. The Estate was to include a model farm, a great arboretum, a game preserve, and the first example of scientific forestry in the country.

Two young men with widely different backgrounds shaped the pattern of forestry at Biltmore. They were Gifford Pinchot and Carl Alwin Schenck.

In 1891, Vanderbilt, himself a young man under thirty, hired Pinchot to take charge of Biltmore Forest and develop forest management plans. Pinchot, scion of a wealthy family, had completed his forestry training in Europe, there being no forestry school in America at that time. Vanderbilt commissioned Pinchot to make Biltmore Estate *"the nest-egg for practical forestry in America."* By 1893, cutting operations were underway and Pinchot's plans to make the forest pay while it was being improved were being carried out. Bernard E. Fernow, then Chief of the *Division of Forestry* in the U. S. Department of Agriculture, wrote that *"forest management has not been put into operation on any other area in the country except Biltmore." (From, "Breaking New Ground" by Gifford Pinchot.)*

Pisgah Forest, 100,000 acres of mountainous land, was later added to the Biltmore holdings. Within these lands, ranging from 2,000 feet in altitude over most of Biltmore Forest and rising to 5,721 feet at the summit of Mount Pisgah, the northern and southern forests met and mingled. Here were oaks and other broad leaf trees, pines on the old fields, spruce and balsam on the higher elevations. Chestnuts, yellow poplar, cherry and walnut were represented through the area. According to Pinchot, Biltmore Forest had in all nearly 70 different kinds of trees.

By 1894, news of the work at Biltmore had spread at home and abroad. Applications were coming in from aspiring forestry students and trained foresters wanting to gain knowledge and experience. Pinchot, with work in his New York office and the growing work at Biltmore, suggested that Vanderbilt employ a resident forester. Since there were no American foresters available for employment, a young German named Carl Alwin Schenck was chosen. He arrived at Biltmore in the spring of 1895.

Schenck's first job on the Estate was largely logging and sawmilling, and the covering up of the eyesores on the 50-odd small, erosion-impoverished farms that Vanderbilt had acquired in accumulating his holdings. Vanderbilt was especially interested in reforesting their old abandoned and eroded fields with hardwoods. Using a

C. R. Patton is area conservationist, SCS, at Johnson City, Tennessee. He was formerly work unit conservationist at Asheville, N. C. and is chairman of the SCSA annual meeting local arrangements committee.

bull-tongue plow Schenck planted acorns and hickory nuts on these old fields, but the plantings were complete failures as squirrels and mice destroyed the seeds.

Schenck then experimented with commercial tree seedlings from Germany and found that he got perfect stands of white pine. In 1897, some 500,000 two-year-old white pine seedlings were received and planted on the most eroded fields of the estate. These plantations are now sixty years old; tall, straight-bodied trees yielding pulpwood and lumber, and will be seen October 21 when the Estate is toured by *SCSA* members.

Conservationists will be interested in Schenck's description of his work:

> *"Most of the abandoned fields afforested were traversed by deep gullies. Here erosion had to be combatted, as in the Alps, at the points of origin. At the upper ends of the gullies rough wickerworks a few inches high were made of poles deeply set and of branches interwoven or laid from pole to pole.* [*See Figure.*] *The scheme worked marvelously. Within the short period of five years the gullies disappeared and within ten years the worn-out fields were covered by thickets of white pine." (From, "The Biltmore Story" by Carl Alwin Schenck.)*

The continued demand for formal forestry training led Schenck, with the best of laboratories at Biltmore, to advertise that a school of forestry would open at Biltmore.

However, even before this, Schenck had gathered together some *"forestry apprentices"* who were useful in nursery work, cone collecting, seed extraction and as general errand boys. Schenck also gave the apprentices talks on forestry from his European textbooks.

The forestry school formally opened in 1898. That fall, regular classes were started with lectures in the mornings, followed by horseback trips in the afternoons to sections of the Estate where forestry work was progressing.

Don E. Lauderburn, consulting forester at Hattiesburg, Mississippi, and until his retirement, a forester with the U. S. Soil Conservation Service, was one of the 200 or more graduates of the school. Lauderburn says that when he arrived at Biltmore in September, 1906, he found the student body assembling for lectures in a lodge at one of the Estate entrances.

> *"Schenck, a tall athletic figure, with a handle-bar mustache, would stride in smoking a big cigar, and lecture on silviculture, mensuration, finance, and other basic phases of forestry. Usually after lunch we would meet him at an appointed place, all on horseback. He would come galloping by and we would all follow to some phase of field work. We*

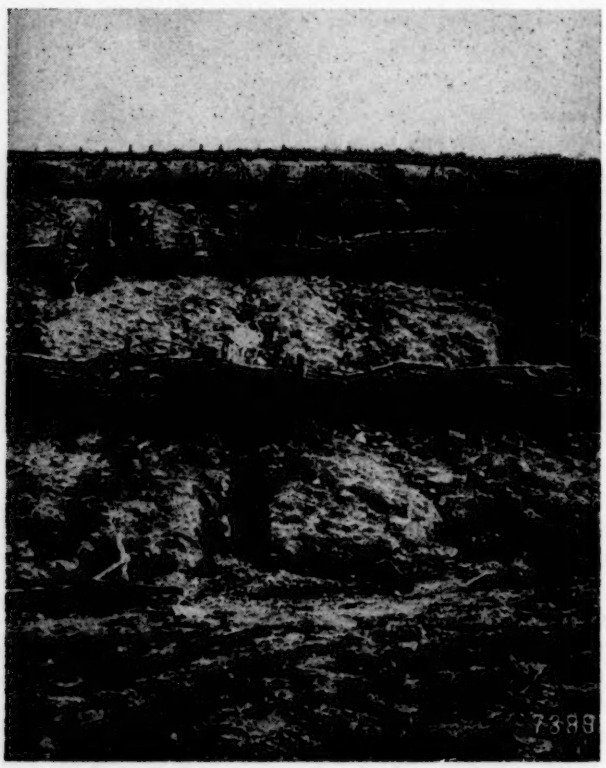


Figure 1. ERODED OLD-ORCHARD site first protected by wattles and brush as it appeared in 1897, two years before it was planted with white pines by Carl A. Schenck. Even before the turn of the century foresters were strongly advocating erosion control and watershed management in the Southern Appalachians.

got practical application in our field trips, laying out roads, planting trees, estimating timber, or some other branch of forest work.

"Much of the time there was a visiting professor, teaching some subject as geology, entomology, or other science. It provided a marvelous life, under the leadership of a vibrant, strong personality, with more time in the field than in the lecture room. The summer months were spent far up in the mountains in a beautiful valley called The Pink Beds."

Perhaps the greatest, certainly the most far-reaching, accomplishment of Dr. Schenck at Biltmore was the establishment of the first forestry school in the United States.

One of the school's students, Verne Rhoades, class of 1906, lives in Asheville and is still keenly interested in conservation. He was employed by the U. S. Forest Service from 1909 until 1925, serving as the first supervisor of Pisgah National Forest. Afterwards he had charge of land acquisition for the Great Smoky Mountains National Park. *"There's no question about it,"* Mr. Rhoades said recently, *"Pinchot's experience at Biltmore Forest and Dr. Schenck's forestry school were powerful influences on the conservation movement in America."*

Gifford Pinchot left Biltmore Forest in Schenck's able hands to join Theodore Roosevelt in the great conservation battles of the early 1900's.

Besides his official connection with the President of the United States as first Chief of the Bureau of Forestry, having been appointed in 1898, Pinchot was able to meet Roosevelt socially on the tennis courts and on horseback rides.

Their close agreement on what should be done about forestry and conservation finally bore fruit in the passage of two laws that are milestones in this country's conser-

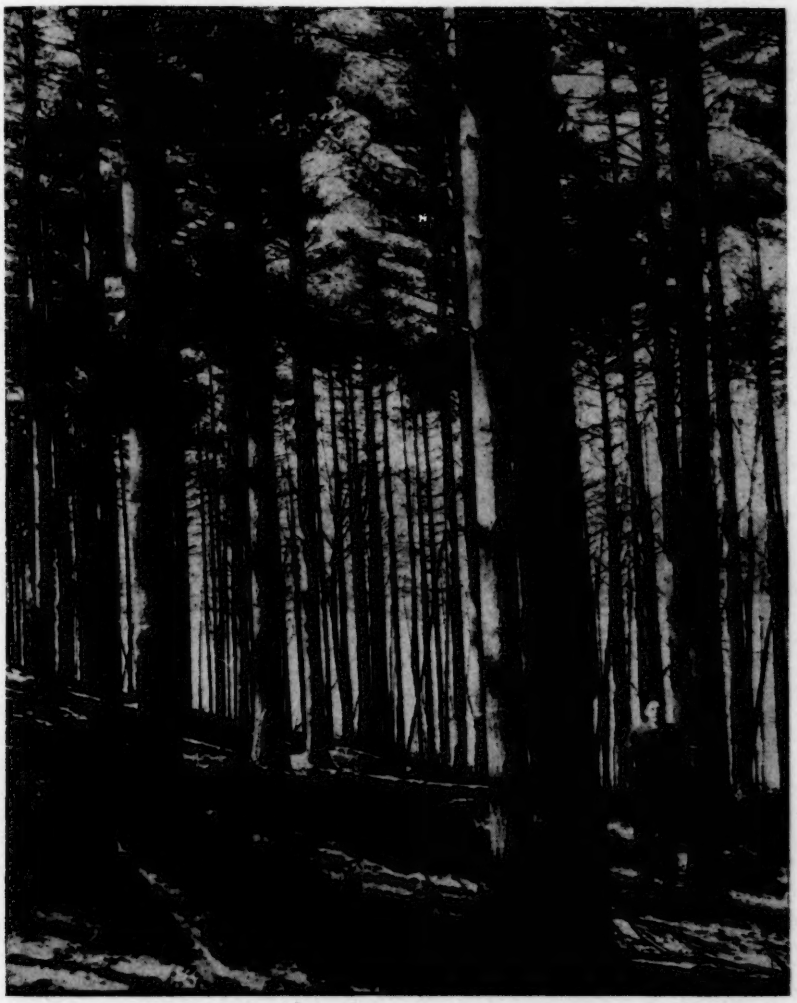


Figure 2. TODAY Schenck's pine plantations provide for studies of thinnings. Six thinnings in this 61-year-old stand resulted in a gain in stumpage value over check plots of $198.40 per acre . . . and the erosion was stopped.

Figure 3. TILE DRAINAGE on this river-bottom field was installed 50 years ago. William Allen *(left)*, of the Estate, and C. R. Patton, SCS, examine a junction. Tiles and bricks were manufactured on the Estate.

Figure 4. THE GRASS on the Biltmore Estate was the best he saw on his several trips across America, according to F. Fraser Darling, famous British ecologist, reporting in his book, *Pelican in the Wilderness.*

vation movement. **The Transfer Act** was passed in 1905, to put the U. S. Forest Reserves under supervision of the Department of Agriculture. **The Weeks Law** was enacted in 1911 and authorized purchase of land on the headwaters of navigable streams for conservation purposes.

Here Biltmore Estate enters the picture again, and according to Pinchot in his book, *"Breaking New Ground":*

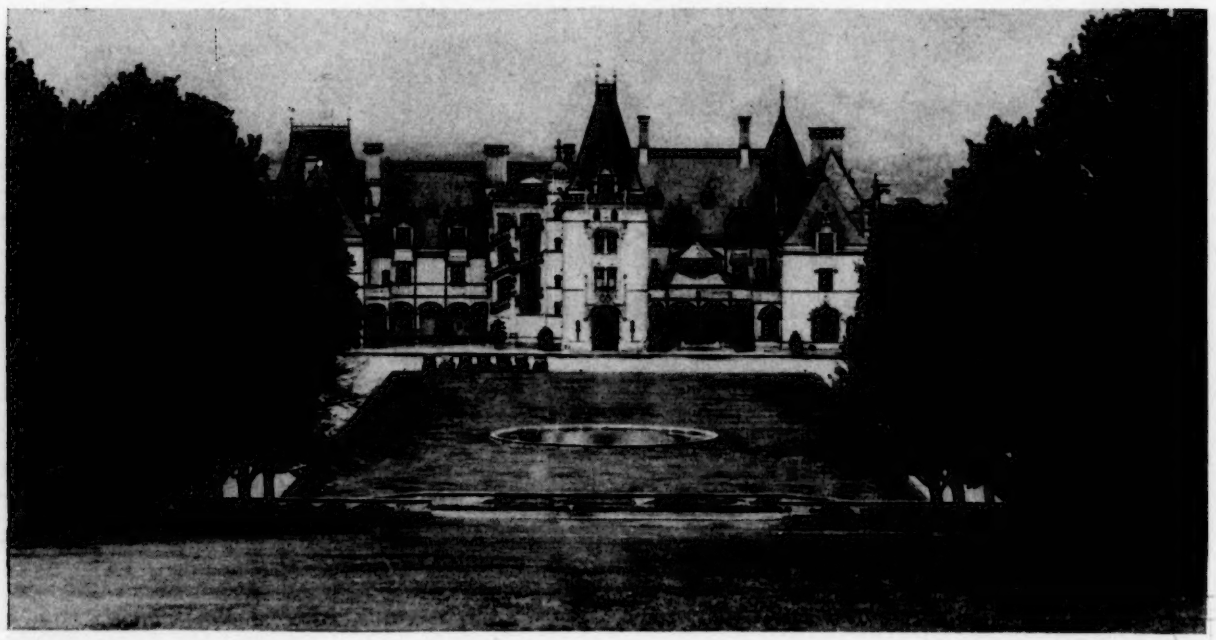
"Biltmore Forest made another contribution to the progress of Forestry in America that thoroughly deserves to be remembered.

"Professor Joseph A. Holmes, at that time State Geologist of North Carolina, was one of the best men I ever ran across. He and I were holding a session on things in general and forestry in particular around the fire at the Brick House one night in the winter of '92 or '93 I'm not sure which. In the course of it he suggested that the Federal Government ought to buy a big tract of timberland in the Southern Appalachians and practice forestry on it.

"It was a great plan, and neither he nor I ever let it drop. Nearly 20 years later the Weeks Law was passed, Holmes's dream came true, and today Eastern and Middle Western National Forests which cover eighteen millions of acres owe their origin to his brilliant suggestion."

During the fight for the passage of the Weeks Law, two important facts were brought out. One, investiga-

Figure 5. BILTMORE HOUSE from the Esplanade. Designed by Richard M. Hunt along the lines of the French Renaissance chateaux, this magnificent mansion was completed by George W. Vanderbilt in 1895. Special railroad tracks were laid to transport the Indiana limestone and other construction materials.



tions by the Division of Forestry and the Geological Survey proved that forests affected the flow of streams; and second, that the Federal government has power to deal with the conservation and improvement of navigable streams. **The idea of watershed protection was in the minds of conservation leaders a half century ago.**

Among the conservation "firsts" at Biltmore Estate was the forestry exhibit prepared by Pinchot for the World's Columbian Exposition at Chicago in 1893. That was the first formal exhibit of scientific forestry ever made in the United States.

The first Forest Festival in this country was put on by Dr. Schenck in 1908, fifty years ago. Foresters, legislators, engineers and lumbermen were entertained on tours, picnics, fishing and shooting contests, a 'possum hunt and a gala dinner. *Soil Conservation Society of America* members will view some of the same scenes at their 13th Annual Meeting this October.

Biltmore Estate today is a conservation showplace seen each year by thousands of visitors who must enter through the famous Lodge Gate. There, massive, ornate wrought-iron gates, taken from the north wall of the City of Jerusalem, swing open to almost another world so beautiful is the landscape. The famous Biltmore House with its furnishings, the greenhouse, gardens and dairy farms must be seen to be appreciated.

The *Ashville Citizen* commented editorially in July, 1957, that, *"Biltmore Estate, among other things, represents the 'first and continuing American example of successful scientific forestry.' It was a milestone in our National progress toward protection and proper use of forests and played a role in the great conservation movement in America."*

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Figure 6. VERNE RHOADES, a graduate of Dr. Schenck's Biltmore School of Forestry in 1906, at his office in Asheville. Rhoades served as first supervisor of the Pisgah National Forest and is still active on conservation.

Figure 7. THROUGH the Lodge Gate, entrance to the Biltmore Estate, pass the visitors (over 65,000 during 1957). The ornate, wrought-iron gates which came from the North Wall of the City of Jerusalem serve as a worthy entrance to the birthplace of forestry in America.

ASHEVILLE IN 1958

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Pine and Hardwood Forest Water Yield

JOHN D. HEWLETT

Rainfall over the Appalachian Mountains furnishes some fifty million people with a large proportion of their municipal, industrial, and agricultural water supplies. Future management of such a vast area for both timber and water will raise many questions about the influence of different forest types on water yield. For example, will there be differences in the quantity of water flowing from a hardwood forest when converted to pine? This article tells of one experimental effort to make the conversion and find out.

TWO MOUNTAIN WATERSHEDS comprising 70 acres at the Coweeta Hydrologic Laboratory in western North Carolina have been cleared of native hardwoods and planted to white pine. The experiment is one of a series to show the influence of vegetation on streamflow, and as such is one of the largest of its kind ever attempted.

The success of the project depends greatly on the control afforded by the watershed network enclosing the two drainages. The experimental area is an interlocking system of small distinct drainages, selected by hydrologists after careful search through the Southern Appalachian region. Deep, well-drained soils, dense vegetation, and a superabundant rainfall—nearly 80 inches annually—provide ideal conditions for certain types of hydrologic research. The research installations and results have attracted the attention of scientists the world over.

Measurements of rainfall and streamflow constitute the core of hydrologic investigations, and these and other climatic factors have been recorded for many years on twenty-two forested watersheds at Coweeta. This 5600-acre research laboratory of the United States Forest Service has been in operation since 1934, providing fundamental information about the influence of forests and forest land-use on water supplies.

Studies of Comparative Water Yield

Research now in progress at Coweeta includes studies of comparative water yield from several types of vegetal cover. Mature mountain hardwood forest is the base from which the comparisons are made. For example, one study demonstrated large increases in streamflow from a 33-acre drainage area when the native hardwood forest was cut down (Hoover 1944). Another showed a smaller increase when a dense understory of laurel and rhododendron was removed from a 50-acre watershed (Johnson and Kovner 1956). Current plans call for conversion of a hardwood forest to grass cover to determine the differential effect of these two cover types on water yield.

John D. Hewlett is research forester at the 5600-acre Coweeta Hydrologic Laboratory in western North Carolina. This is a research installation of the Southeastern Forest Experiment Station, Forest Service, U. S. Department of Agriculture. Laboratory address is Route 1, Dillard, Georgia.

These experimental treatments have shown that drastic reductions in forest cover can increase streamflow temporarily up to 65 per cent. How radical do the changes have to be to result in a minimal but significant increase? Does a shift from one forest type to another offer opportunity for manipulating streamflow? Such changes may take place gradually as a result of purposeful management, or more rapidly, as in cases of severe insect infestation or fire. Differences in water yield from similar forest types are difficult if not impossible to demonstrate, and generally require more sensitive field experiments than have been designed up to this time. On the other hand, obvious structural differences between pine and hardwood stands suggest some differential effects on water yield large enough to be detected by conventional experimental techniques. These effects may also be large enough to influence decisions in practical efforts to manage forest land for more and better quality water.

There are many important reasons for converting hardwood to pine and testing the differences in water yield. Three major considerations are:

First, pine and mixed stands in which pines predominate cover large areas in the eastern United States. Pine forests are not restricted to the southern pine belt and Piedmont areas, but occur also on the watersheds of the Appalachian Mountains (Fig. 1). Some of these pine stands are native; others are the result of natural reseeding or planting of abandoned farmland and logged areas. The practice of planting old fields to pine has increased steadily since the early thirties. Efforts are now being made to convert still other areas of mountain

Figure 1. Pure and mixed pine stands cover large areas in the Southern Appalachians.

Figure 2. Planting white pine on a clear-cut watershed. Hardwood sprouts will be cut back annually to insure a pure pine cover.

land now in unproductive low-grade hardwoods to more valuable stands of pine.

Second, many managed municipal watersheds, including those which are strictly reserved for single-purpose use, are partly or wholly in some types of coniferous forest cover. Pines are among the favorite species to plant on such watersheds because they are fast growing, easy to establish and manage, and usually are available at low cost from forest nurseries. If the current trend continues toward producing sustained-yield harvests of timber as well as water from municipal watersheds, management for pine stands may increase. The question will arise as to which should be favored, pine or hardwood, for best yields of clean, quality water.

Third, if future managers of these pinelands and potential pinelands are to have the information they need, the slow processes of hydrologic experimentation must start now. Experiments in which the effects of large-scale vegetation changes on streamflow are determined from rainfall and runoff records require many years to complete. To begin with, we must know the behavior of the stream from a study area before any changes are made. Owing to variations in climate—particularly rainfall—and fluctuating soil water storage, one or two years' record from a watershed is of limited value in assessing the effects of treatment. As a general rule, pre-treatment and post-treatment records should not be less than five years each, and in some cases must be longer.

Evapotranspiration from Pine and Hardwood

In any study of water yield, the amount of rainfall reaching the stream on a water-tight drainage is equal to the precipitation minus the water losses from various evaporative processes. The monthly, seasonal, or annual water loss from vegetated land surfaces is the integrated effects of a dynamic interaction between meteorologic, biologic, and edaphic factors. Meteorologic conditions, including rainfall, humidity, temperature, solar radiation, and wind movement, are thought to exert the largest effect on evaporation rates, and thus on the amount of water released to the streams. However, several experiments have shown that limited control over streamflow can be attained by changes in vegetal cover. The evidence is against spectacular differences in water yield from pine and hardwood, but the possibility of detectable differences still remains.

The respective influence of pines and hardwoods on disposition of rainfall has been the subject of much discussion among hydrologists. Among other things, pines differ from hardwoods in density of crowns and stems, growth form, depth of rooting, total leaf areas, and in the seasonal shedding of leaves. Where pines and hardwoods occur on similar sites, these factors might affect water yield.

Kramer (1942) has shown that white, red, loblolly, and slash pine on the average transpired at about 25 per cent of their maximum transpiration rates when soil temperature was artificially reduced to 32 degrees Fahrenheit. White pine alone, apparently better adapted to northern climates, transpired 40 percent of its maximum rate when the soil was approaching the freezing point. No direct comparison between pine and hardwood is available, but since winter transpiration losses from deciduous trees must take place through twigs and bark, it seems reasonable to assume that more opportunity for transpiration exists in pines than in hardwoods, particularly during mild winter weather.

Plant physiologists suspect that transpiration rates under some conditions are associated directly with total leaf surfaces exposed to the atmosphere. It has been calculated that pines have total numbers of leaves, as well as total leaf areas, several times those of comparable-size hardwoods (Kramer 1952). In addition to the effect on transpiration rates, the greater leaf areas of

pine imply more loss of rainfall by direct interception and evaporation from needle surfaces. Estimates of interception losses for forests in different climates have ranged from about 10 to 38 per cent of precipitation. To be sure, this variable loss is mostly a function of rainfall characteristics, such as size and intensity of storms, but sufficient latitude exists to allow vegetation characteristics to exert some influence on interception.

The depth of rooting is another factor which may affect the total amount of water removed from the soil by vegetation. Unless soil depth is limiting, there may be a general tendency for either pines or hardwoods to develop relatively deeper root systems. In dry times, trees with deeper roots will, naturally, have access to and use greater quantities of stored water than trees with shallow roots.

Some characteristics of dense pine stands may tend to inhibit water loss. Deeper crowns and stem densities, particularly of white pine, may reduce wind velocities and light intensities within such stands. At the same time, the heavy litter accumulation typical of some pines affords greater insulation to ground surfaces. Evaporation from the forest floor, an appreciable loss of water in hardwood stands with thin litter, may be reduced by the blanketing effect of pine vegetation.

These conflicting and perhaps compensating tendencies toward water loss or conservation are impossible to isolate and measure separately, at least under natural conditions. Plant physiologists working under controlled conditions have learned much about the behavior and capabilities of individual plants, but are frank to admit that the water relations of plant communities in nature cannot be predicted with sufficient certainty to be useful in water yield studies. For the present, at least, field studies on gaged watersheds seem to offer the best approach to practical information about the water relations of forest communities.

The Coweeta Study

The study described herein was begun in 1955 on a watershed formerly clear-cut to determine the influence of hardwood removal on streamflow (Hoover 1944). In 1956 a second watershed unit was also cleared and planted. Both drainages were gaged for nearly 20 years prior to planting.

White pine was selected as the species most likely to succeed; and seedlings were set out by hand at 6 ft. by 6 ft. horizontal spacing (Fig. 2). Need for routine release cuttings is anticipated for several years. One treated watershed faces north and the other south, affording an opportunity to compare results on opposing aspects. Each cleared and planted watershed is associated with a control drainage on which an undisturbed mature hardwood forest will be maintained throughout the course of the study.

The methods used in this particular study have become standard in hydrologic investigations. The basic instruments are rain gages and the weirs that intercept and measure streamflow. The relative accuracy of rainfall estimates depends on the number and proper location of gages. The performance of a weir depends in no small part on design factors and how well it is constructed. The selected watershed should be neither too large to treat experimentally, nor so small as to allow minor variations in underground water divides to be a proportionally large source of error. The unit watersheds in this experiment average about 35 acres, more than sufficient to sustain permanent streamflow even in the driest years.

Use of a control watershed is essential in studies which aim at showing variations in streamflow due to vegetation changes. It is preferable to have controls adjacent to treated watersheds, a condition admirably satisfied in the study reported here (Fig. 3). The more similar the rainfall, soils and climate on treated and control watersheds, the more sensitive will be the test of changes in streamflow.

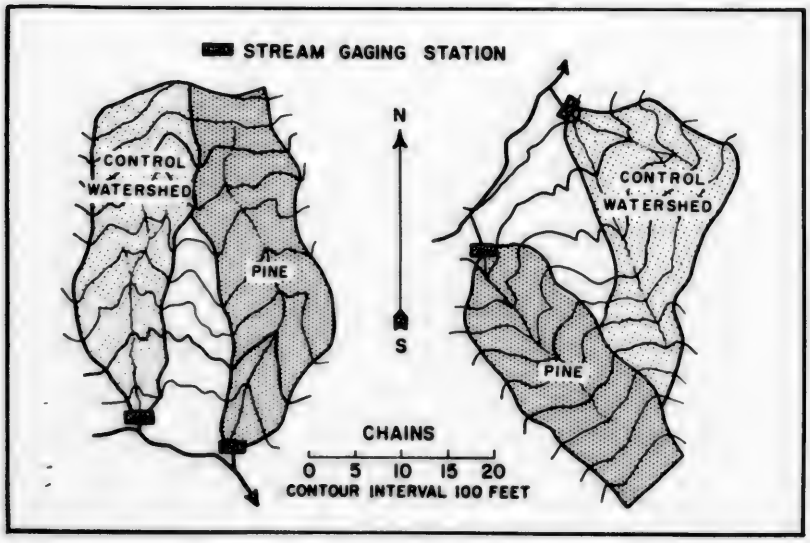

Figure 3. Map showing orientation of the test watersheds and the adjacent controls.

Precipitation and streamflow were measured for many years on the two control watersheds and the two converted watersheds before any clearing was done. By deducting streamflow from precipitation, the relative magnitude of water losses under native hardwoods was established. This was roughly 38 area inches annually, averaged for all four watersheds. Establishment of regression relations between treated and control units showed that the streamflow from one watershed can be predicted from another to within 5 per cent accuracy, limited by the range of precipitation experienced during the calibration (pre-treatment) period. During subsequent months, seasons, or years, streamflow on the treated drainage is predicted from the control. If the actual flow is significantly different from the predicted flow, the difference is said to be due to the treatment.

A basis for a preliminary analysis of the effects of the hardwood conversion to white pine will be provided within ten years, or when the pine plantations have completed crown closure. It is expected that the study will continue through the management phases of pine to an ultimate comparison of mature stands. Methods of managing white pine on watersheds will presumably become an integral part of the later stages of the study.

White Pine Test Planting: A Preview

In anticipation of the experiment outlined above, three small test plots were planted to pine on the north-facing watershed in 1945. The plots, now containing trees up to 25 feet in height, afford a preview of conditions on the entire watershed in ten years time (Fig. 4).

Dense young pine stands with heavy needle-fall are proficient in eliminating understory vegetation once crown closure is accomplished. Accumulated litter, low light intensities, and a tendency toward acidity in the developing humus create conditions generally considered unfavorable to the activity of soil micro-fauna and low-growing shrubs and herbaceous plants. Some of the trends in forest floor development and understory vegetation are already quite apparent in the 12-year-old test plots as illustrated (Fig. 5).

Figure 4 ***(Below).*** **Test plot of white pine planted in 1945. Some stems exceed 25 feet in height.**

Figure 5 ***(Right).*** **Interior of one of the white pine plots. Note dense crowns and litter buildup.**

A comparison of the test plots with nearby hardwood stands shows some changes in the upper layers of the soil. Although there appears to be less humus incorporated with mineral soil under pine, the total depth of litter and unincorporated humus tends to be greater through most of the year than under hardwoods. This leaves little reason to believe that storm peaks or soil movement will increase as the stand develops. On the contrary, with less seasonal fluctuation in litter depth, the soil on these experimental watersheds may have better protection throughout the year under pine cover.

The two large plantations stand as a living laboratory in which to investigate the value of pine on mountain watersheds of Eastern United States. Little is known about possible effects of deeper litter on interception losses. Converting a hardwood site to pine may have long-range effects on the permeability of humus and the upper layers of the mineral soil beneath. The greater combustibility of pine litter and the consequent danger of severe burns on pine-covered watersheds are conditions which may affect watershed management objectives. These and other important influences of pine on the watershed are to be investigated as part of this long-term research problem.

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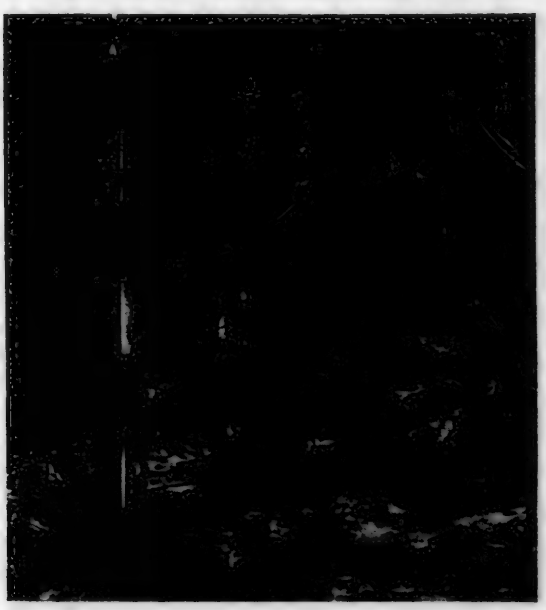

Southern Appalachian Grasslands

ROY R. BECK

The improvement of permanent pastures is one of the more important land-use conservation measures advocated for the Southern Appalachians. This humid mesothermal plant-growth region predominates in loams and stony loams of the Ashe and Porters soil series. It follows the Blue Ridge mountains and associated mountains from northern Alabama north through the Carolinas, Tennessee and Kentucky into Virginia and West Virginia.

Figure 1. NAKED PLACE MOUNTAIN panorama across Glenn G. Palmer's mountain grazing tract. Farm roads were built for hauling in fertilizer and lime.

MOST PASTURES in this region are either bluegrass sods or improved perennial grass and legume pastures that have been limed, fertilized, and seeded to more productive tall grasses and legumes. The perennial grass and legume pastures gradually revert to bluegrass when grazed in the manner customary to this region.

A large acreage of grassland is involved in the pastures of this region. According to the 1954 census, in 25 western North Carolina counties there were 854,000 acres of permanent pasture of which 613,000 acres are native unimproved grass. If the extensive acreages in Tennessee, Kentucky, Virginia, and West Virginia are included, much land is involved.

Many of these native *disclimax* grasslands are on class VI and VII lands having slopes exceeding 25 per cent, so steep that farm machinery cannot be operated over them. It is with these grasslands that this paper deals. These steep grazing tracts are in effect rangelands. The Soil Conservation Service defines rangelands as "lands suitable for grazing by domestic livestock and supporting uncultivated forage, primarily native grasses and other forage plants." The grasslands under discussion here fit this definition. They should be utilized and managed as rangelands or be converted to forests of desirable species.

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Trends in Use

The Southern Appalachians were covered by magnificent forests when the first white settlers arrived. The settlers cleared the rolling hills and mountain slopes using oxen, mules and horses. Steepness of the land meant little as long as the land was fertile. But the conversion from woods to pasture gradually stopped. In fact, the trend has been reversed. Between 1938 and 1955, over 500,000 acres of open land in western North Carolina reverted to woodlands. That was a 14 per cent gain in forest area, mostly hardwoods considered of low value.

Mechanization in agriculture and the advent of industry in the new South helped wrought the change. Although subsistence farming had been a way-of-life for

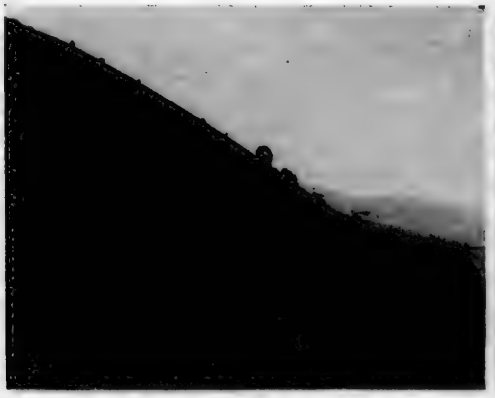

Figure 2. Thistles and hawthorns invade this closely grazed range and point up a major problem.

Figure 3. F. M. Noland, farmer, shows timothy heads on range where grazing was deferred until grass was over six inches.

Figure 4. Noland calls steers into salt-lick. This range has not been fertilized for 40 years, but gets grazed moderately.

these people, it was not good enough for their children. The mountainous tracts were sold, mostly to more progressive valley-dwelling cattle farmers, who bought the abandoned farms for use as grazing tracts.

Today, these valley farmers range their herds on mountain grazing lands during summer months. They winter their stock in the valleys, feeding corn silage and hay grown on level to gently-rolling tractor-farmed land. For them, it has proved to be a good farm economy which they supplement with small acreages of cash crops such as burley tobacco, vegetables and horticultural specialties. Thus, the grazing lands are an essential part of the agricultural economy of much of this region. On many of these farms, good conservation programs are being developed, especially where the ratios of range, meadow and crop lands are near suitable economic proportions.

In the past, the steep native disclimax grasslands have been maintained by hand mowing and shrubbing of invading weeds and woody plants that the people call "*filth*". As the holdings became larger, cheap labor was used. It was learned that early and close grazing also helped to keep down the invading weeds and woody plants. This kind of grazing management became an accepted practice. Native climax tall grasses quickly gave way to blue grass on the better sites and weak perennials and summer annuals on the poorer sites. Thus, a bluegrass country was developed.

With the advent of the Tennessee Valley Authority and the Agricultural Adjustment Administration in the 1930's, use of lime and fertilizers came into the picture. Farmers then were able to maintain the sub-climax short grasses under close grazing management. But today, the high cost of labor is making it economically more difficult to use these materials profitably on steep lands. In fact, the only lime and fertilizers used now on steep grasslands for beef and sheep production are those cost-shared by the ACP and TVA. Many farmers are constructing farm roads through these grasslands for use in getting lime and fertilizers onto the fields as well as for hauling out forest products from adjoining woodlands.

Some Problems

Experiments at the Coweeta Hydrologic Laboratory, located in the southern end of the Appalachians near Franklin, North Carolina, have shown that close grazing of these native grasslands causes rapid compaction of the soil. Water infiltration and permeability rates quickly decline; soils lose their water-storage capacity; and both frequency and volume of surface run-off increase. But in view of the agricultural grazing economy of much of this region, it is unlikely that many farmers will convert their lands from grass to trees in the near future.

Since this is the case on many farms in Haywood County (North Carolina), a search for alternate solutions was begun. The author, in company with farmers, visited and observed many of the grazing tracts. All available publications about permanent pasture produc-

Figure 5. BLUEGRASS range, improved by lime and fertilizer, is kept free of weeds and brush by early and close grazing.

tion and management, obtained from Experiment Stations in North Carolina, Tennessee, Kentucky, Virginia and West Virginia, were studied. The problem was discussed with professional agricultural workers.

Some Observations

1. Ranges, not closely grazed, produce tall native grasses that furnish more forage and for a longer grazing season than do ranges grazed in the usual manner. Farmers usually graze steers for market on the range having the most tall grasses.

2. Invading weeds and woody plants soon become a problem even on the best short grass ranges soon after grazing intensity is reduced.

3. Native disclimax tall grasses can be maintained on the better sites without applications of soil additives provided they are not overgrazed and the invading weeds and woody plants are controlled mechanically or chemically.

4. On the closely grazed poorer sites, summer annuals (early invaders of abandoned cultivated land in plant successions) predominate and are, in fact, the land's salvation.

5. On these poorer sites where summer annuals predominate, seeding of native and adapted exotic tall grasses is desirable.

6. Native tall grasses will reproduce if grazing is deferred for as few as 30 days at the start of the grazing season.

7. Range management techniques, based on the principles of plant succession, would serve as sound guides for land use and treatment.

8. A system of yearly rotation of pastures that will provide early and close grazing 1 year for each 2 or 3 years of delayed and lighter grazing may offer a practicable solution to the grazing management problems these ranges present. During the year of early and close grazing, invading weeds and woody plants will be at least partially controlled yet the tall grasses will survive.

Some Conclusions

- No scientific studies have been made on native grass ranges (pastures) having slopes exceeding 25 per cent to determine how best to manage grazing for maximum sustained forage production and reasonable soil and water conservation.
- Soil compaction, erosion and run-off is reduced when grazing is less intense or delayed.
- Expenditure of public funds for research aimed at solving this problem of management is justified because of:
  a) The large amount of land involved
  b) The effects on soil and water conservation
  c) The effects on the agricultural economy of the region.

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Figure 6. Blackberries are a primary shrub invader of native grass ranges in Haywood county.

Figure 7. Nimblewill (Muhlenbergia Schreberi), a perennial grass, is important and found on the more lightly grazed ranges.

Figure 8. Cattle do a limited amount of grazing, even on ranges not closely grazed.

Too Green The Grass

DURWARD L. ALLEN

Says this author, we must bring the time element into resource use and consider realistically the development of a habitat for man in North America. It's an ecological problem involving quantities of natural wealth, cultural level, numbers of people, and the living standard we require. In that standard, certain welfare factors must be identified now, or generations to come will find the decisions made and values pre-empted.

BIOLOGISTS RECOGNIZE that managing living things for human use is largely a question of controlling environments. This becomes almost a universal truth when we deal with wildlife populations, but one who works with the idea finds applications in an even broader and more fundamental field. The concept is useful in appraising our own relationships to the renewable resources on which we live.

Probably an ecological viewpoint is necessary if we are not to be dismayed and confused by the tangle of complications that beset modern man in making a living from the earth. We need some means of simplifying our "planning" for the future. Actually, no one can make anything like a complete resource plan. But maybe we don't need one if we can tell when we are headed in the right direction.

The basic attitude, I suspect, should be this: that in our researches and operations with resources we are developing a habitat for man in North America.

Of course, this brings *time* and *ethics* into every issue and poses a challenge of high order. For it's almost true that it would be a new departure in human doings. The peoples of history seldom applied such thinking. On the whole, men had short-term, profit motives, with the result that many a civilization left its last remains in a desert. Sometimes they scorched the earth with no better equipment than a flock of sheep or goats. We should ponder that, for today we do things in a big way. With draglines, chain saws, crawler cats, atoms—and that annual flower of congressional statemanship the "omnibus" rivers and harbors bill—we have an awesome potential.

The basic fact is undeniable: for better or worse we *are* building a habitat for man in North America. But that probably doesn't say much.

A habitat for how many people?

And what kind of living standard are we willing to settle for?

If we had approximate answers to those stumpers, there would still be others. What uses of land and water will produce the best result?

Such questions are abstract and unsatisfactory until we bring them down to cases. For experimental purposes, let's consider the past, present, and future of the broad region that includes the Great Plains.

The Past

The Black Hills are centrally located in what was one of the most bountiful environments ever inhabited by primitive man. Rainfall was generally scant, which meant the high plains would grow grass rather than trees. It meant also that minerals collected in surface layers of the soil and yielded forage of top quality.

Journals of early times attest that this habitat produced an amazing abundance of big game and lesser creatures. Many accounts detail the bonanza of buffalo, pronghorns, deer, elk, bighorns, wolves, bears, and birds that inhabited this great pasture land, its brushy bottoms, and outlying, timbered mountains. These animals resources certainly were behind the power and wealth of the Sioux, Cheyennes, Crows, and Blackfoot. The adjustment of the Indian to his environment was fairly simple, and it's a good one to take apart before we go on to something more complex.

The grass-buffalo resource was enduring, and it produced even in times of drouth. Successively, it was exploited by three recognizable levels of the Indian's hunting culture.

Previous to the 1700's, Plains Indians traveled on foot, using dogs as pack animals. They couldn't kill many buffalo, and they couldn't carry much property to comfort their nomadic life. They made poor use of their great animal resource, and it's likely some areas were seldom visited. We could call this the dog culture, and it was "inefficient". It supported a low living standard.

Then an offshoot of the Shoshone tribe moved far to the south and came in contact with Spanish settlements.

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The Indians got horses and learned to use them. They built the powerful Comanche nation and developed a new culture based on horses for hunting and transportation. Horses and prosperity spread across the plains.*

Here was an "industrial revolution" that opened up the buffalo resource to greater use. For the first time the tribes could kill as many animals as they wanted. Many of them built up, expanded their range, and fought over the hunting lands. Even with the increased efficiency of a horse culture, there is no evidence that Indians of the plains made real inroads on buffalo and other game. They probably used a part of the natural surplus annually produced. I suspect this could have gone on indefinitely.

The third cultural level came with the white man. The key to it was the breech-loading rifle; it was highly effective, and with a commercial market to take the product, it made possible the wiping out of buffalo.

It's interesting to speculate what this weapon might have meant if it had been merely handed over for the use of the Indian. Actually, it probably could not give him much more than he had already. But it made buffalo killing easier. If the average buck worked a four-hour day with his bow and lance, he might have been able to do the same job in a two-hour day with a gun. This would have posed a problem of how to use the extra leisure time. He would have had two more hours a day to smoke, gossip, gamble, and hatch ingenious designs on his neighbor's wives and horses. Possibly an Indian so favored would be happier. I don't know, but it does seem we are developing parallels to this situation today.

Going back to those three basic questions, we can conclude that the Indian had not developed a population problem. His numbers were weeded out rapidly by his rugged life and the warfare that had become a social institution. At least, that was the situation during the century and a half on which we can base judgment.

As for living standard, he had an abundant meat diet and lots of time off—if we don't dwell too heavily on the drudgery of squaws. On the northern plains the Indian had a livelihood seldom matched among aboriginal peoples. Land use was no problem. It was extensive in the broadest sense and had no discernible effect on the resource. The economy had been "planned" through thousands of years of natural trial and error.

Immediate Past and Into the Present

Now consider the white man on the plains. He destroyed the old hunting culture entirely. The first thing he required was that the land support more people. He accomplished this by applying two "higher" forms of culture. In some areas he brought in domestic animals and developed a grazing economy. In others he broke the sod and planted grain. He no longer depended on natural adjustments; he was doing his own planning and making calculated demands on the land.

In this semi-arid region people made the same mistake they made the world over. They judged the capacity of their land by wet years rather than dry periods.

When the inevitable drouths came, they regarded it as a temporary "disaster". They tried to hold too much stock on degraded ranges, or they stuck to the grain economy.

Today the whole public is paying the bill for these errors through a subsidy we call "drouth relief". In many areas I think we will have to back up on the intensity of our land use. It appears that some of those grain lands should be in well-managed grazing. And livestock probably should be removed entirely from submarginal semi-deserts. It seems reasonable to require of all our land uses that they be durable and self-supporting.

I suspect there is a particular problem in the arid hills and benchlands of Texas, New Mexico, and other parts of the Southwest. In places, the grazing sequence has been from cattle, to sheep, to goats. Perennial grasses have declined; brush has increased. Of course, range improvement may be the salvation of better areas, if grazing pressure can be reduced. But in the poorest, driest country there probably is another step. This range can grow deer, turkeys, and other game. It's good for public recreation. Over the long haul it probably won't support any use more intensive than the old hunting culture, and the sooner we recognize that the better. Drouth relief is no favor to the people involved. Our money might be better spent in helping them to a new way of life.

What is to be learned from this experience on the plains and fringe lands? Maybe something like this: In small numbers and at a primitive stage of culture, man can fit into the natural community without disruption. But when we build up our numbers, employ a higher culture, and intensify land use, we get into trouble. In our husbandry we have not applied a formula that tells us how far to go. This emphasizes something obvious and well known to any conservationist. Our real measuring stick is the condition of the land itself. It will need to be a part of our standard of social conduct that soil and vegetation must be maintained or improved in use. In this scientific age any other course should be regarded as uncivilized.

For three centuries people in the New World have insisted on their right to destroy resources and to sacrifice the future for the present. The truth is we have been spoiled and pampered by being born to resource riches. For our own good, perhaps, our grass has been too green.

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*[*An excellent publication on this subject is "The Horse in Blackfoot Indian Culture/With Comparative Material From Other Western Tribes" by John C. Ewers. Smithsonian Institution, Bureau of Ethnology Bulletin 159. 1955. U. S. Government Printing Office, Washington 25, D. C. Price $2.75.*]

Now consider an even broader horizon—the adjustment of our present population to the whole North American habitat. Again, we're concerned with numbers, living standard, and land use.

As for numbers, we are at a high level and increasing rapidly. It's self evident that this can't go on forever; the population will have to level off somewhere. No one knows where that will be or what will cause it. But it's certain we will have enough people for all desirable purposes. Already there is evidence of competition and population pressure.

I don't imply that we lack food or other subsistence items. But here in America our living standard has included a great deal more than food, clothing, and shelter. And we have reached the point where we must decide whether the rest of it is worth keeping.

Specifically, we have enjoyed the luxury of living space to spare. We have had the free and easy use of our out-of-doors for fishing, hunting, and other kinds of recreation. These space and wildlife resources are real, and the demand for them is growing even faster than the population. Unfortunately they are disappearing under the attrition of our land "reclamation and development". Most of the natural and economical developments are carried out with private capital. It's appropriate that this should continue in our productive areas.

But today we are pushing our expansion by public projects for the conversion of "wild" lands. We are paying huge public subsidies to drain lakes and marshes and to replumb our western river systems for watering deserts. We fail to be deterred from this demanding program even by the embarrassment of a 7-billion-dollar hoard of surplus crops. I think the public supports this tax burden in ignorance of its final effects. People have been sold the proposition that anything is justified if it makes more business temporarily.

The Future: Progress Toward What?

Possibly we can understand the long-term significance of the reclamation movement by applying a little ecology and habitat knowledge. When you broaden the resource base on which a population grows, that population continues to expand. When you develop an environment to make more of it habitable (i.e., fill in the blank places) the population increases. When we convert deserts and marshes to cropland, we build new communities of people or add to the old ones. The ultimate effect will be about the same as if we bulldozed the Rocky Mountains into the Pacific Ocean and created another state. It will mean more people and more competition for every kind of natural wealth.

Our numbers have a huge capacity to expand, and it's obvious we're not going to control that directly. The population will seek its level on the basis of its environment. But the biologist knows we can exert some effect on numbers by managing habitat. And we can do something about living standard at the same time.

Our outdoor assets—forests, parks, wilderness, wildlife lands, and recreation areas—are the most fragile and vulnerable of all our resources. They can be preserved only by creating an iron-clad public policy that says: These things are a part of life in America, and we are going to keep them, come what may. That will take resolution, for the truth is we haven't seen anything like the pressures still ahead.

Actually, adopting this viewpoint would not need to deny anyone the privilege of more business. With the public now spending $3 billion a year on hunting and fishing alone, it seems reasonable to conclude that recreation industries can take the place of dam-building and crop-growing as make-work activities. The recreation business has the advantage of being self-supporting.

I'm under no illusions about such a change in public thinking. The difficulties seem almost insurmountable. But this is a field where the truth could make us free. We must seek out the truth and make it effective. We have reached a stage in our history where Americans should take another look at their old obsession, the "expanding economy". This notion seems to be a way of insisting that the world owes us a profit. Probably the free use of abundant resources is as close as anyone ever came to getting something for nothing. While we were a few people in a big continent we learned to assume that any intensification of land use is "progress". But today we must ask, progress toward what?

Regardless of how we go about it, I suppose everyone is after a better life. That means a higher living standard, and it's something we haven't yet defined. Unfortunately, it means different things to different people.

Recently I heard a lecture on atomic energy, and the speaker emphasized the great power of the H-bomb as compared with TNT. With this huge energy source, he said, we will make over the earth and build ourselves "a shiny new world". Clearly enough, his idea of a modern landscape featured straight lines and square corners—great expanses of concrete and metal. The speaker implied that the human race is headed toward the paradise of a completely planned and manufactured environment, and he could hardly wait.

This raises the question of what is wrong with a world that's green? What does it take to make a human being happy? If men unlock enough cosmic secrets to live in health, work in usefulness, and die in dignity, what more do they require? Carl Sandburg admonishes that people shouldn't get too comfortable. Does that imply we are happiest when kept busy? Maybe it's a way of saying that the operation of an atom-age culture cannot be a completely painless process. Certain it is that someone

must come to grips with technical problems in total unconcern for the 6-hour day and 4-day week. Maybe it will be a sign that we are ready for this era when we decide to reward the scientist for his differential effort.

There are two ways to get more from a given fund of resources. One is to develop a more efficient culture pattern, and we are doing that constantly with our modern science. The other is to borrow against the future—a thing we have likewise done. I think we can tell what our living standard should be by going back again to look at our habitat. Are we improving it, or tearing it down? If our range is being degraded, then we are taking too much. As a guideline, it probably is fair to say: *That is rightfully ours which we can get by doing things better and without expense to future owners of the land.*

Certainly this does not apply just to cropland. It applies to forests, ranges, and recreational land and water. All these are part of our habitat, helping to produce the things that constitute our good life.

Ecological Realism Needed

Providing for people yet unborn certainly is a moral issue, and it has been gratifying to me that some of our religious leaders and philosophers are giving this greater emphasis. There is a hereafter here on earth that is badly in need of salvation. The resources of today are what mankind is going to live with from now on.

If we destroy the runs of salmon, that is irrevocable. If we use up all the power sites, let's remember that the reservoirs are silting in. If we convert all possible wet lands to cropfields, keep in mind that these organic soils are exposed to oxidation and subsidence. Many of the benefits are temporary and costly. In taking them now we are consuming our reserves and giving generations of the future no share in the decisions on which their fate will depend. Are we so much wiser than they, in presuming to such a course?

Through centuries, men have pursued the chimera that there is a land of milk and honey where the easy life awaits them as a reward for merely living. Sometimes, I'll admit, they nearly found it; but always they fell short because too many people got in the game.

Today we like to picture that never-never land as lying beyond the scientific frontier. That's not a bad ideal. But we'll get there only if we see man and nature as a *biological problem*. Nuclear physics, engineering, and soil chemistry are not the only respectable technologies, despite their enthusiastic press. It will be a lop-sided civilization if we can't muster some ecological realism in managing our own habitat.

CAN WE LEARN to "see man and nature as a biological problem"? *L-R*, Waters S. Davis, Nolan J. Fuqua (treasurer and president, respectively, of the National Association of Soil Conservation Districts and SCSA members) and Willis G. Scholl, executive vice-president of Allis-Chalmers Manufacturing Company, examine an excellent watershed model. Agriculture and industry are learning how to team up in getting "some ecological realism in managing our own habitat", but we all still have a long way to go.

Districts, Forestry, and Wildlife Management

CHARLES H. STODDARD

Progress has been made in applying soil and water conservation measures to land. Farmers and landowners in general accept the soil conservation district system as a means of cooperating with technical agencies. Professional conservationists recognize that only a good start has been made. A combination of technical and local cooperation provides a formula for long-term progress. Some readers may not agree with everything the author says, and feel that there may be "jurisdictional implications" involved. The Editor would welcome views and comments.

FORESTERS AND WILDLIFE BIOLOGISTS have developed a refined body of specialized knowledge but have found somewhat less than enthusiastic acceptance by landowners generally. *The Timber Resource Review* of the Forest Service has made it eminently clear that continuously applied forest management is seriously lagging on most small farm and nonfarm forest properties —despite a good deal of effort on the part of technical foresters. Likewise, farmers who enthusiastically apply soil erosion control practices to their crop and pasture land have shown much less interest in those practices designed to improve wildlife habitat. Considerably fewer wildlife recommendations of farm planners are executed by landowners than those practices directly related to production of farm crops.

Because the soil conservation district has proved to be such a successful medium for obtaining landowner cooperation in applied soil erosion control this article has been written to explore the possibilities for greater district participation in forestry and wildlife management; and to attempt to delineate factors which may be helpful in extending these activities.

The Forestry Problem on Small Ownerships

The Timber Resource Review (1) of the Forest Service has cited the problems arising out of small private ownership as the most important unsolved problem in forestry. These small tracts embrace three-fifths of our 500 million acres of forest land. Forest properties divided among 3.4 million farmers average about 50 acres and account for 165 million acres. Nonfarm owners hold 1.1 million tracts totaling 130 million acres of which the average size is 120 acres. Both this recent survey and earlier studies have shown these tracts to be poorly managed. Much of our timber for the future will have to come from small forests.

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For a number of years we have tried a series of programs based upon the assumption that individual forest owners would give the same response to technical assistance and to subsidies that has been given to similar activities in agriculture. That we have made some progress is undeniable but not nearly as much as the problem demands. For example, the Private Forest Management Assistance program (2) report for 1955 shows that only 5½ per cent of the nation's small landowners have been reached by the farm foresters since 1940. Reports from the Agricultural Conservation Program show that less than one per cent of the payments were made for forestry practices in the past 20 years (3).

It is becoming increasingly clear that the conventional educational techniques are inadequate in persuading owners to undertake forestry on their lands and to manage them continuously into the future. Some of the reasons are beginning to be understood through recent studies of ownership (4): Forestry is a sideline for most small owners; non-residents often live too far away and lack the time, skills and equipment needed to conduct forestry operations; returns from partial cuttings are infrequent and small; changes in ownership often force liquidation; forest investments lack liquidity and are less attractive than the cash they bring. Thus owners are discouraged from undertaking long term forestry plans, particularly when few of them are able to supervise their execution.

Out of this analysis three problems seem to emerge:

1. The difficulty encountered in carrying on forestry operations at infrequent intervals by nonfarm owners living at distances and occupied full time in earning a livelihood.

2. The fact that these tracts are usually too small to warrant consistent attention and are in a sense uneconomically operatable.

3. Small forests are not organized as continuous business units (as are farm lands, for example) and hence not susceptible to technical and financial inducements.

Individual situations may vary considerably but these

problems or conditions are general enough to be common throughout. Thus it may be deduced that any facilities which are available to owners to perform management and operational functions would contribute toward improving forestry practices. Where consulting foresters have been retained by larger owners to perform these services this has followed.

The essential facilities which could provide the kind of forest managerial operating service required by small owners should probably include:

1. A permanent local organization authorized to enter into agreements with owners and to serve as a local medium, through which public assistance programs (technical, advisory, subsidy, etc.) and private facilities (such as consulting foresters, logging contractors, timber buyers, etc.) may be brought together.

2. Provision for entering into cooperative management agreements to carry out supervisory functions such as tree planting, logging, stand improvement, forestry planning, timber marking, and marketing assistance. Such operations could be coordinated and supervised by the organization acting as an agent for the owner, but actually carried by the several cooperating public and private agencies.

While many of these suggestions have been tried out by several nonprofit forestry associations and in varying degrees by some soil conservation districts (Dunn County, Wisconsin, and several Illinois districts for example), the experience is too limited for any widespread conclusions.

Landowner-Sportsman-Wildlife Conflicts

Another problem, of a somewhat different nature but many similar elements, may be found on the same lands where forestry and soil conservation programs are establishing themselves. Wildlife, whether game birds, mammals or fish, requires a well-balanced habitat in which to grow and flourish. A combination of open fields, hedgerow fences, forest and brushy woodland borders, clean water areas, and proper high-quality food sources are basic to the maintenance of wildlife populations.

But modern agriculture is designed technically for efficient crop production—*long fields, "clean" fencerows without hedges, drained marshes and wetlands, improved pastures* and *regular applications of pesticides.* An economy such as ours puts heavy pressures on landowners for cash incomes, so a duck marsh is drained to produce 50 or 75 bushels of corn per acre instead of a family of wild ducks. Timber is cut to provide open pasture, woodlands are grazed or stock is permitted ingress, and overgrown fencerows bulldozed out.

Wildlife as legal property is held by the state in trust for all its citizens; it does not belong to the private landowner on whose land it lives. The average farmer receives little income from the rabbits, quail, grouse or deer harvested by sportsmen. In fact the presence of wild game simply invites hunters who sometimes leave fences open and often cause damage to property. "No trespass" signs appear (5). Land on which brush patches, potholes, marshes, and fencerows have been eliminated are seldom visited by hunters.

Nevertheless, some farmers, personally interested in wildlife, have cooperated with state wildlife technicians by planting food and cover in odd corners or on wasteland, but these are far from adequate. In fact wetland drainage, land clearing and other measures seem to be accelerating.

The problem seems to be one of finding the means of making the establishment and maintenance of wildlife habitat (and hence production of wildlife crops) attractive to farmers and landowners by transferring a portion of the risk and expense to sportsmen, who, in turn for accepting this responsibility would be permitted to have access to private lands. Some experimental attempts to solve this sportsman-landowner conflict have been successfully worked out in a number of localities and with various approaches (Williamston project in Michigan, Frontiers, Inc. in Oregon and the plans of several state conservation departments—Florida, Pennsylvania, California, Illinois, Montana, Utah, etc.). Such group efforts have improved sportsman responsibility but there is a need also to find widespread major incentives for landowners to establish and maintain improvements in wildlife habitat.

As in forestry there is a need for an approach which would enable the farmer to carry out the recommendations of the technical wildlife managers. Many landowners would be willing to devote strategic spots to wildlife cover but the cost of its establishment is greater than they can afford. Others want some form of compensation for land and labor devoted to wildlife coverts particularly if there is a reduction in crop or pasture land. Some means for carrying on the work required in wildlife habitat improvement and for compensating owners would undoubtedly result in far greater interest than is shown today. Gearing together sportsmen's organized efforts to reduce conflict over possible damage coupled with technical service and economic incentives to landowners could prove to be a workable combination in attacking this stubborn problem. Cooperating farms and other lands might be opened to sportsmen under a special licensing program and the funds raised by such fees could be used to compensate owners for devoting more areas to wildlife production which would be opened to sportsmen.

The District and Land Management

The contrast between the relatively slow rate of progress in applied forestry and wildlife management practices with the rapid application of soil and water conservation measures where the districts have played an important role logically leads us to what they might do to resolve these problems. It is true that terracing, contour tillage, and strip cropping, are practices which farmers recognize as essential in saving their cropland and increasing yields and that they may have an immediate economic incentive to adopt them. On the other hand the benefits from forestry measures in increased timber returns are usually postponed for some years. Wildlife offers less prospect of financial inducements to the average farmer under any present arrangements.

Although we have no means for determining with any degree of certainty how fast soil conservation practices would have been adopted without districts (since technical aid by the Soil Conservation Service usually was made conditional upon forming a district), there is every reason to believe that the district has functioned in such a way as to bring technical and operational services to bear on the problem at hand. It serves as a continuous body to which the landowner can turn for information, assistance and services on conservation measures—and thus it serves in several ways as a familiar local organization to overcome inertia, to provide group-ownership of expensive machinery, to set standards of performance, and other useful activities. Indeed the districts have served farmers well and have performed an essential service in land management.

Since Soil Conservation Districts are continuous local bodies which have been dealing largely with soil and water conservation problems, let us consider how they might be directed toward forestry and wildlife programs which are or can be included in most farm plans. Cope (6) has shown that during the period when the Soil Conservation Service was actively in charge of farm forestry programs (until 1949) forestry was given sufficient special attention so that wider applications of forestry took place than in any of the other farm forestry programs. Most state Soil Conservation District laws are quite broad in their powers and permit a variety of functions related to their basic objective. Furthermore, districts very nearly include almost all of the private farm and forest land in the country where wildlife and forestry problems are critical. To adapt them so as to provide these additional services would seem to require no additional legal authority but rather a policy formulation of the tasks to be undertaken, some additions to organizational structure, and means to carry them out. Most of the districts have technical personnel familiar with forestry and wildlife problems, or could enter into cooperative agreements with the state and federal agencies which have such personnel. Overhead costs could therefore be spread over several activities.

The suggestions which follow are offered as possibilities for experimentation.

Too often in the past we have found ourselves with full-blown national programs based upon assumptions which were not entirely accurate and failed to accomplish the objectives desired as a result. This author believes that, through experimental applications, many land policy proposals would become refined—if workable retain them, otherwise eliminate them before they become crystallized.

The current emphasis of the soil conservation district programs, oriented as they are mainly in the direction of crop and pasture land practices, will require some modifications and adjustments if they are to include more emphasis upon forestry and wildlife management. For example, technical assistance is available mainly through the formal cooperative agreements of the federal Soil Conservation Service. The Cooperative Farm Forestry program of the state forestry departments and the federal Forest Service has not yet been generally tied in with the districts although in many cases technical assistance in forestry is given independently to cooperators. Likewise, the wildlife management specialists of the state departments of conservation (and the U. S. Fish and Wildlife Service) in many states are not working with the districts through any formal cooperative agreements. There is some evidence to indicate that inter-agency rivalry—particularly at the federal level—is a factor in this absence of cooperation with the districts. The landowner—to whom all state and federal agencies are merely the "government"—is oftentimes confused by the present situation.

A first and highly important step in attaining better handling of forestry and wildlife programs would be to stop agency competition by coordinating all programs dealing with private farm and forest land conservation problems at the local level through the soil conservation districts. At present the Agricultural Conservation Program subsidies are paid only to landowners who have approval by the technical agency involved. It would be only one short step to correlate all landowner assistance programs through the districts; and by so doing the districts would have concentrated manpower and a clear mandate to work on all problems as a whole. Not only would the agencies be coordinated at the local level, but there would be more assurance that the planning for conservation practices would bring about the greatest application on the farms since owners would be expected to agree with the district to maintain the practices when once installed. At present cooperating owners with the other agencies are not required to continue in effect the practices undertaken.

In the case of forestry the soil conservation district would need to undertake a management service for forest owners not in a position to carry out the recommendations of the foresters and farm planners. The implementation of such plans as tree planting, timber stand improvement, harvesting and marketing merchantable timber is too often an obstacle to woodland owners who lack equipment or time or know-how to carry them out (7). In such cases the district could act as a supervising agent on a fee basis. Where consulting foresters and contract loggers are available the district would simply supply the supervisory service, thus assuring the owner that sound forestry was being carried out and that his interests were protected. Record keeping would be an important function in this additional activity. This enlargement of district activities to supply these needed services beyond the technical advisory stage would simply fit the services to the demands of the situation at hand, and serve to overcome a conservation problem.

Direct operating functions would be carried out by the district only if contractual services were unfavorable. The district could also correlate market information, supply buyers with volumes and prices of timber products offered for sale, keep records for owners and otherwise act in the interest of the owners. The fee charged for these services would be the means for sustaining the overhead costs required. In return for these services the owner would also agree to abide by the forestry practices included in his management plan and agreement with the district. By spreading the overhead costs among many owners and by supplying the services which owners need, the forestry function of the soil conservation district would serve its woodlands in much the same manner as the district ranger on a National Forest.

Expanding district functions to include more direct attention to wildlife habitat and harvest problems would call for some additional programming. Here, as in the case of forestry, closer cooperation between the technical conservation agencies would supply some of the manpower needed by the district to handle these additional duties. Assuming that farm plans have been made for a number of the farms in the districts which include wildlife habitat practices, as yet not undertaken, the problem is one of gearing farmer cooperation with that of sportsmen into a program beneficial to both. Some of the elements of such a program have been suggested: An agreement with a sportsmen's group to accept responsibility for damage; agreement by sportsmen to obtain permission upon entering farmer's land to hunt; agreement by landowner to dedicate certain areas called for by the farm plan for wildlife habitat; agreement by the sportsmen's group to assist in the cost of establishing such measures as fencing woodlots and streambanks and planting wildlife shrub cover; leaving strips of crops standing; planting fence corners for winter food patches; and many other practices which represent cash outlays. And if sportsmen mean business they may arrange to pay the landowner an annual fee based upon his area dedicated to wildlife habitat.

These types of arrangements probably should be developed experimentally between the soil conservation districts and local sportsmen's organizations: the former acting for the landowners and the latter for the sportsmen. In such a procedure many problems and details which are not at first apparent will develop and can be met. The essential elements of the plan should include access by responsible sportsmen in return for which they share some of the cost to landowners for devoting a portion of their lands to wildlife habitat.

Conclusions

Generally speaking the application of forestry practices and wildlife habitat management has not been applied by landowners with the same vigor as have other soil and water conservation measures. Neither of these problems has yielded to educational or technical assistance programs except to a very limited degree. Nor have they been integrated with soil conservation districts to the extent possible—partly because of differences in approaches to application by forestry and wildlife agencies. Since much of the success in applied soil and water conservation is attributed to the soil conservation districts, it is suggested that an experimental program for gearing forestry and wildlife programs into the district approach be tried. Means are suggested whereby the districts might provide more active supervision over forestry programs and develop cooperative wildlife programs with sportsmen's groups. Considerably more inter-agency cooperation and experimentation will be required for such programs than exists at present. Concurrently with such experimentation, research and analysis should be carried on to determine the reasons for successes or failures.

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The Human Side of Watershed Programs—III

E. J. NIEDERFRANK AND WENDELL R. TASCHER

Previous articles (December 1956 and July 1957) pointed out that various human factors affect the development of watershed programs. Principles of program development concerning people were listed and a case history was reported. In this article, based on extended studies of watershed development throughout the country, there are listed "summary guideposts" and other resources of aid to those who must obtain firm community involvement in small watershed programs.

EACH WATERSHED undertaking (PL 566 and others) represents in itself a major social-action process, which involves the same principles and types of activities as those being used in the Twelve Mile Creek watershed program described in an earlier article of this series.

This process begins with the initiation of an idea and leads through to some degree of application or completion. The results were successful in Twelve Mile Creek because human factors were understood and basic principles were applied or in operation.

Figure 1 illustrates the four main stages in what is called the social action process and how more and more people are involved from one stage to another. These are not separate and unrelated stages, operating with sharp cut-off points. Instead, work may be going on—

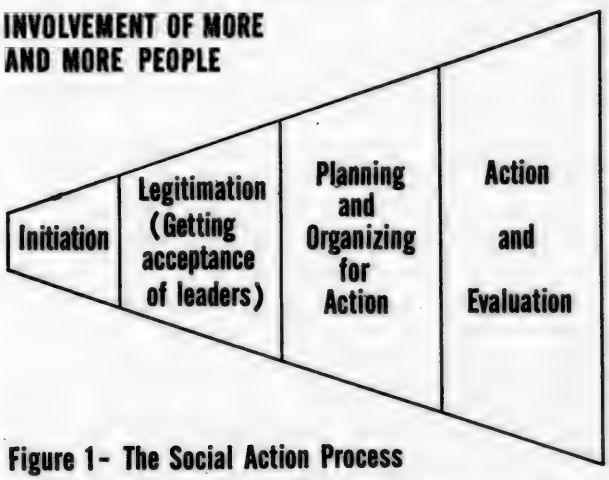
INVOLVEMENT OF MORE AND MORE PEOPLE
Initiation
Legitimation (Getting acceptance of leaders)
Planning and Organizing for Action
Action and Evaluation

Figure 1- The Social Action Process

growth of people and development in program may be taking place in all four of these stages at the same time. It is important that a thorough job be done in each stage before getting too far into the other stages. Evaluation should be continuous.

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This theory and practice on the social action process is not unique to small watershed program development. Neither is it new, for the principles have been basic to human action through the ages. They apply in varying degree and manner to almost any kind of a program, project, or activity. We know more about them today because we have more research findings and evaluated experiences to draw upon.

Many thousands of professional workers are contacting farmers and ranchers in connection with various regular program activities. Most of these workers do not have much formal training in the theories and sciences of dealing with people. Frequently there is the tendency to hesitate, or to follow stereotype rules or a negative pattern of action, when problems of dealing with people arise. Improvement of knowledge in this area will benefit professional assistance. This is the time to think about local resources and begin drawing upon them as situations indicate.

In previous articles in this series, we have pointed out some basic principles of program development, human factors affecting progress in watershed activities, and suggested procedures for dealing with socio-economic situations as revealed by the actual experiences in the Twelve Mile Creek watershed of Pickens County, South Carolina. Since then we have studied experiences with watershed programs elsewhere, and there is a similarity of problems encountered and successful procedures. (A comprehensive listing of suggestions appears in a new leaflet, *Some Notes About Watershed Development Programs in Oklahoma,* by the Oklahoma Extension Service, Stillwater, Oklahoma.

Summary Guideposts

From the experiences of various watersheds studied can be derived the following general guideposts, of aid to persons concerned:

1. Determine and understand the neighborhood-community patterns of the people in relation to the watershed
2. Encourage the development of the program through local leadership and influence groups

3. Divide the watershed plan into sub-projects or construction units and decide on priorities
4. Stress land-treatment measures
5. Use sub-project procedure to get easements
6. Keep in mind that some easements will be hard to get
7. The program must be the people's program, not that of the agencies
8. People must have confidence in agency staff members
9. Use both the individual and group approach
10. Use positive language when presenting facts
11. Watershed development is a town-country concern
12. Organization for watershed development may be either formal or informal
13. Be patient and know the leadership
14. Plan and develop teamwork among agencies
15. Watershed development is a continuous process.

In most of the watersheds studied it seemed to take several years before the community-of-interest viewpoints became understood. For example, after some ten years of work in the Little Sioux (Iowa) watershed urban and rural groups recognized that they had interests in common. Conservation practices are now applied at a faster rate than earlier. Farmers take predictable routes in the establishment of their conservation work. Experienced professional workers recognize this and conduct their interviews and meetings and prepare educational materials in view of these patterns.

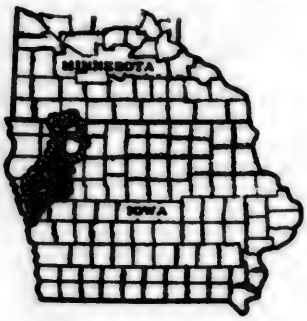


Figure 2. After ten years, urban and rural groups in the Little Sioux (Iowa) watershed recognized interests in common.

Educational bulletins, circulars, and other printed items directed to particular watersheds are not widely used. Enough reaction was noted that study should be made of increased use of such materials. Generally, however, it was felt that local newspapers did an excellent job of publicizing the local activities but that this is not enough. There must be education and involvement that are deeper than mere publicity.

There is strong evidence that a well-defined watershed plan developed by the people of the area, is stimulative to establishment of upland control practices. Farmers will more readily apply recommended measures on their farms when they have a part in the planning and educational work. The demonstration value of a watershed is large and at this time draws people from many miles away. Various community interests can be demonstrated, too, such as recreation, wildlife, stream clearance, flood control, reforestation, urban water supply, and highway and bridge protection.

It is evident that there is need for in-service training activities to prepare staff members for their work with and in small watersheds. Joint staff workshops on this subject might well be undertaken in states where intensity justifies. The success of watershed development will depend upon both the adequacy of the unique soil and water conservation technology involved, and on the adequacy of the treatment of many social and economic factors involved in getting the job done soundly and effectively.

Know and Use Social Science Resources

We have tried to show in the articles in this series how individuals on the job can improve their knowledge of certain theory and practice involved in social action, and at the same time to help them further identify and use resources of sociology and psychology. There are various types of such resources.

Local Resources. One source of social understanding is locally employed professional persons. Nearly all communities usually have individuals who have had experiences in the practicable aspects of social resources programs. Some of these are clergymen, social workers, physicians, psychiatrists, lawyers, bankers, and school principals. Conferences or meetings of professional conservation and extension workers and local leaders with these persons on particular problems involving people should aid in developing knowledge of the subject and provide help in solving specific problems.

Specialized Area Resources. Do you know of any social science or adult-education people at your state agricultural college or university? Most of these institutions have a department or unit of sociology or rural sociology. Many also have one or more extension specialists in applied sociology, community organization, or extension training and research. Socially-minded agricultural economists may also be helpful. State universities have departments, or at least persons, in fields of social work and adult education. Perhaps a smaller college nearby may have one or more persons who could also give counsel and guidance along the line of applied social science.

Seek out the available specialized resource people in your area. Visit with them about your watershed organization, leadership, and motivation problems. Ask their advice on readings and persons that may be helpful.

Publication Resources. A subject of such importance as human behavior should merit attention in the reading about it. Considerable literature is available today that bears on the theory and practice of social science, adult-education principles and group processes. Much is fragmentary in books, bulletins and periodicals. Here are some publications that deal quite specifically with topics of applied social science, and which every professional agricultural worker who deals with people should study from time to time:

How Farmers Accept New Ideas. Written by the North Central Committee of Rural Sociology. A 6-page leaflet available from the Iowa Extension Service, Ames. 1955.

Main Types of Organization Found in Extension Work and Related Social Factors. E. J. Niederfrank. Federal Extension Service Circular 500, Washington, D. C., 26 pages. 1955.

Dynamics of Group Action. D. M. Hall. 240 pages. 1957.

Techniques That Produce Teamwork. Warren H. Schmidt and Paul Buchanan. 75 pages. 1954.

Successful Human Relations. William J. Reilly. 144 pages. 1952.

How to be a Modern Leader. Lawrence K. Frank. 62 pages. 1954.

Exploring the Small Community. Otto G. Hoiberg. University of Nebraska Press. 199 pages. 1955.

Rural Sociology. Lowrey Nelson. An excellent textbook on this subject. Revised edition 1955.

American Society: Urban and Rural. Brunner and Hallenbeck. A textbook. 1956.

The Group Workshop Way. Paul F. Douglas. Association Press. 174 pages. 1956.

Leadership for Rural Life. Dwight Sanderson. 127 pages. 1940.

Adult Leadership. A journal published monthly by the Adult Education Association, 743 N. Wabash Ave., Chicago 11, Ill. Summary digests available, also some short bulletins on various specialized topics in group leadership and action. (See particularly *The Leader's Digest* compiled from Vol. 1 of *Adult Leadership.*)

In-Service Training and Graduate Study

More and more professional agricultural workers are found attending colleges and universities today, taking courses in rural sociology, adult education, extension methods, group development, leadership, and communication. Some study from one to three years on curricula leading to an advanced degree, while others take selected courses, or attend special short courses, summer sessions and laboratories for professional employment. The regional extension summer schools, which are open to staff members in various agencies, are listed:

Northeast Regional Extension Summer School, Cornell University, Ithaca, N. Y.

North Central Regional Summer School, University of Wisconsin, Madison.

Southern Regional Extension Summer School, University of Arkansas, Fayetteville.

Western Regional Extension Summer School, Colorado State University, Fort Collins.

Information about these schools may be obtained by writing to the extension director of the respective state in which they are held. Several other state extension services also conduct summer schools and short courses for personnel primarily within their states.

Professional workers of various agencies and organizations have found much benefit in attending one of the several *national training laboratories in group development.* Among the principal ones are Bethel, Maine, and the University of California. Information about these may be obtained by writing the *National Education Association,* 1201 16th Street, NW, Washington 6, D. C.

There are opportunities for doing research in the social-economic aspects of watershed development, even while on the job as a part of the regular development of the program. Departments of rural sociology encourage and assist one in undertaking such research.

Broader Viewpoint and Interrelated Approaches

We are in a period of pronounced merging rural and urban interests, of closer town-country relations, and of interdisciplinary work on basic problems. More and more professional agricultural workers of the future will be coming from larger towns and cities. Social science concepts which are being increasingly recognized as important, no doubt can and will be just as effectively presented by persons with urban background as with rural.

Urban reared and urban trained social scientists will be seeking to know more about the human relations problems of agricultural workers and community leaders, and they will be better able to assist them than in times past. This will be all to the good. Agricultural workers will be better trained in over-all social-economic analysis and in the practical arts of working with people based on sound principles and findings of research. More social science will be problem-oriented and action-centered. Persons in this field will be able to teach courses and to direct studies from applied points of view without overlooking the basic considerations.

Social science principles and techniques relating to conservation and similar problems can be and will be considered more in meetings of professional agricultural workers; also, conservation and other agricultural problems will be treated more in meetings of social scientists. There will be more joint meetings and treatments of sub-

jects and more inter-disciplinary efforts. Communities are complex and agricultural and conservation problems are many-sided.

Principles and practices of social action which apply to watershed programs are likewise effective in other programs and educational activities. There are individuals in professional conservation work who now have the training and experience to tell a story for others to follow. We need their writings on this subject.

We also need greater consideration of social-economic aspects in the over-all evaluation of watershed programs, and the bulletins on this subject prepared for and by the federal and state agencies.

Various educational materials and methods fall into patterns of natural community orientation and other group methods. The grouping of farms in sub-watersheds for educational work can follow this principle. The same might be true for aerial maps by communities or social groups of farms, photographs of groups considering local problems, and in the delineation of social-economic areas on the watershed maps which are included with plans. The importance of making reference to communities in news stories of local happenings should not be overlooked. Neighborhood and group tours or air lifts for observation study are especially effective in watershed work, particularly just before new work is to be undertaken in given areas. Soil Stewardship Week, Rural Life Sunday, and other work with local clergymen are also strong in their social-action implications.

The Big Challenge Today

The underlying challenge in agricultural land use for today and the future is whether *community of interests* and *community participation* in the development of policies and programs are to be given effective places in dealing with the problems of land and water that are already here or on the horizon. Related to this is the question of whether adequate area economic analysis will be made on the planning; for today farm organization and operations are affected more than ever before by marketing developments, regional competition, and other factors beyond farm boundaries. Sound analysis for future production planning is more important than ever before.

Conservation of soil and water relating to agriculture is a major part of this total problem. But in bringing the whole challenge to the foreground today there are many other community concerns which relate to land use: Subburbanization; industrial decentralization; need of land for additional recreation, school, and highway facilities; preservation of natural areas; need for attention to sanitation, pollution, community beautification, real estate policies and procedures, commercial development in the countryside; effects of changes in agriculture and marketing; and etc.

Consider the problem of denuding subdivision areas of all trees before building. Probably this is done, not because the developer dislikes trees, but because certain construction and land-grade codes are perhaps built into credit policies. Other problems: Are sufficient park lands and natural areas going to be set aside? Will there be buffer zones around suburban commercial or industrial developments? Will land use and water management programs be adequately considered in suburban expansion? Rural zoning—both its desirability and its content—is also becoming a more and more pertinent question today. Technological changes of various kinds have already produced the need for major adjustments in agriculture, and even more adjustment lies ahead.

It is clearly obvious therefore, that the limiting factors to desirable policies will be overcome, and desirable developments will occur, *only when and to the extent* that effective consideration is given to community of interests and wide-range factors through some kind of effective community participation and involvement of people. Such involvement includes those who have or can help get the facts needed for sound planning. This can be achieved, not only for watershed programs in agricultural areas, but for all agricultural resource problems of the community in the years ahead. A major role of professional workers in agricultural agencies, business development, and civic planning bodies should be to lend support and leadership to this concept, in a spirit of cooperative effort on a scale that we have not known before.

Figure 3. Treatment of a watershed to prevent abuses of the land depends on the people in it—their interest and how well we understand the people.

Rushcreek Watershed Organizes

PEARL L. FOGLE

THE RUSHCREEK WATERSHED ASSOCIATION in Ohio is an example of how people in a small watershed can organize to improve their community welfare.

This particular watershed organization resulted from a meeting attended by over 100 people who responded to an invitation conveyed in a letter from the mayor of Bremen.

The purpose of the organization, according to the mayor's letter, "would be to set up committees to study the various phases of the soil and water problem throughout this watershed and to sponsor the development of a plan which would have as its objective the fullest and most efficient use of all soil and water and related natural resources." And further, "after studying and recommending a plan, if warranted, the Watershed Association would also sponsor formation of a Conservancy District to carry the water control features of such a plan into effect." (Conservancy Districts organized under Ohio law have authority to co-sponsor Public Law 566 watershed programs together with soil conservation districts.)

Figure 1. Rushcreek Watershed Association members hear results of surveys and vote to apply for a PL 566 project.

The Rushcreek Watershed Association is made up of two or more members from each township and village. A president, vice-president, secretary and treasurer are elected. Committees have been set up to include *finance, public relations and education, farm survey, town residence survey,* and *industrial survey.*

Pearl L. Fogle is area conservationist with the Soil Conservation Service at Lancaster, Ohio.

A Questionnaire Was Devised

The Farm Survey committee of the Association has perhaps done more work to date than any other committee. It designed a survey form which imparts as well as collects information. It was assisted in a farm-by-farm survey by Vocational Agriculture boys. The work of this committee has done much to coordinate the work of many "conservation" and land and water use agencies by bringing their various programs to bear on the common objective of a watershed. These agencies were invited to suggest survey questions which would stimulate the thinking of the farmer and at the same time provide information useful in the formulation of agency programs to meet the needs of the watershed.

Included in the questionnaire was a flood damage tabulation which showed the extent and severity of floodplain damage by various types of floods.

On the last page of the questionnaire was a place for the farmer's signature stating that he approved this study of the water problem for the entire watershed and of his farm, as an integral part. Upon signing he authorized that permission was granted to enter upon his land to facilitate the entire watershed study, provided he was kept informed of the progress and the purpose for which ingress was desired.

The various parts of the questionnaire were assembled into one unit and a map of the watershed was on the cover sheet.

How the High School Boys Helped

The 150,000 acre watershed falls mainly into eight school districts, six of which have either vocational agriculture or agricultural departments.

The six classes averaging 30 boys (180 in all) were trained in land judging and given the reasoning back of each question on the survey form. They became versed in water runoff figures from many types of plant cover under various conservation practices.

A letter from the agriculture teacher went ahead of the boys with the questionnaire to each farm owner in the watershed explaining the objectives of the proposed watershed program. It asked the farmer for his careful consideration of answers and his cooperation in helping to develop a watershed program. It was pointed out that he was also making a contribution to the education of a boy on conservation matters.

This letter was most helpful. Very few flat refusals were reported.

How Did You Use the Rainfall?

A new approach in evaluating a farm operation was worked into the survey form by the Soil Conservation Service. Since the primary stress is on water in a watershed program, the land-use pattern and conservation practices were evaluated on each farm on the basis of how well each farmer uses the 38 inches of rainfall his farm receives each year on the average.

Here was an effective method not only for securing information on crops and practices but at the same time giving farmers a new slant on the value of a protected woods over a grazed woods, or a good pasture over a poor pasture, or a contoured row over one up and down the hill.

The method first credits the farm with the 38 inches of annual rainfall—then subtracts 6 inches which our research workers tell us percolates into the soil to emerge as spring or stream flow. The boy then asks the farmer how many acres of corn he had and has him describe the field. This is where the boy's experience in land judging pays off. He first inquires about the slope and shows the farmer how this factor influences runoff. He next talks about erosion, and when he shows that under certain crop and practice conditions half as much water is lost from a field with its original topsoil as compared with a field where half of the topsoil is gone, he arouses the farmer's interest. The boy continues to check each item appearing on the survey form. Research figures again help to show the farmer what's happening on each field.

The farmer can compare the water-holding features of his farm plan with others in the watershed. A wholesome competition is injected here, especially since water in the soil is a factor in the production of a crop the same as fertilizer—except fertilizer costs money.

District Supervisors Helped

The supervisors of the three soil conservation districts involved in the Rushcreek Watershed paid the agriculture boys 50 cents for each individual farm survey made. They believed this was fair compensation for the "two-way" educational service rendered. In most cases the boys shared one half of their earnings with their Future Farmers of America chapter. For 495 questionnaires returned, the Watershed Association and District supervisors paid the students $247.50.

Working with these boys has demonstrated that the abilities and interests of young people should never be sold short. The agricultural students and teachers who carried out the farm survey became familiar with many soil and water relationships in the watershed.

Analysis

All of the returned questionnaires have been analyzed and summarized under the headings of main streams and tributaries.

Information was obtained on: (1) over-all basic watershed soil-water-flood damage figures; (2) direct-contact publicity and information methods through filling out of the questionnaire; (3) how to obtain permission, granted through good faith, to enter on the land and carry out engineering studies; (4) the leaders in the communities who would be best fitted to call groups of farmers together to discuss local water disposal problems;

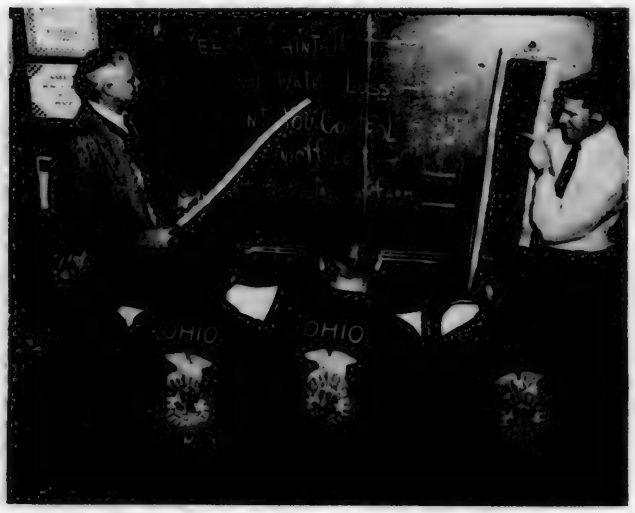


Figure 2. The high school boys were schooled in run-off principles and figures on various kinds of cover and conservation practices. . . .

Figure 3. It was also found that experience in land judging paid off when the boys visited farms in the watershed to conduct the survey.

(5) how many land-owners would be interested in part-time employment if industry associated itself with a stabilized water program in the area.

About 50 per cent of the farms were covered. This was enough to show general trends of interest in the program, localities of specific and special interest, general flood damage conditions, and specific upland soil and water problem areas. The "two-way" educational values have been most worthy.

Figure 4. There was a place on the survey form for the farmer to sign stating that he approved the study and would permit further studies.

The Women Also Helped

The Town Residence Survey Committee asked the Bremen Ladies Auxiliary of the American Legion to help complete a flood-damage survey. Using a form designed to procure information on damages from the worst flood on record, an intermediate flood, and one that might be considered an annual flood, some 12 women went from house to house in the town.

The information they obtained has enabled the Watershed Association to determine how much of the watershed program can be justified on the basis of urban damages.

Each segment of population has different problems. Bremen has flood problems. New Lexington, Junction City and Rushville need a water supply. They all want recreation and the farmers want to store water for crop production.

Community Cooperation Has Prospered

Out of the study has come an increase in an inter-community cooperation. Each community has come to believe that it prospers only as its neighboring communities in the watershed prosper. They see interdependencies "of smoke stacks and hay stacks"—with water important to both. The Public Relations and Education Committee of the Watershed Association has fostered this kind of thinking through press releases.

If watershed programs are to be locally conceived, local people must take the initiative. The few who see the need must devise means of moving the mass—the more people brought in on the actual job, the better understanding all people will have.

The Rushcreek example shows how local people conceived their own program. Whether or not they can use Public Law 566 will depend upon the problems they discover. Nevertheless the members have voted to go ahead and make application. However it turns out those people who are directly concerned will have already answered many of their own questions.

Figure 5. The Rushville Agricultural class built a watershed model to scale. It helped in the educational program in their school district.

Common Chemical Helps Seal Leaky Ponds

E. V. WICKLINE

TWENTY-FIVE FARM PONDS, in the limestone area in Greenbrier County in West Virginia, that were complete failures due to excess seepage, are now holding water satisfactorily as a result of a new chemical treatment of the soil inside the reservoir. Since none of the treated ponds is much more than a year old, it is not known how permanent a seal has been obtained. The results to date appear to justify continued use of the process. The chemical is sodium tripolyphosphate widely used in household detergents. The ponds treated range in size from 1/20 of an acre to ¼ acre. Technicians of the U. S. Soil Conservation Service in Greenbrier County supervised the work.

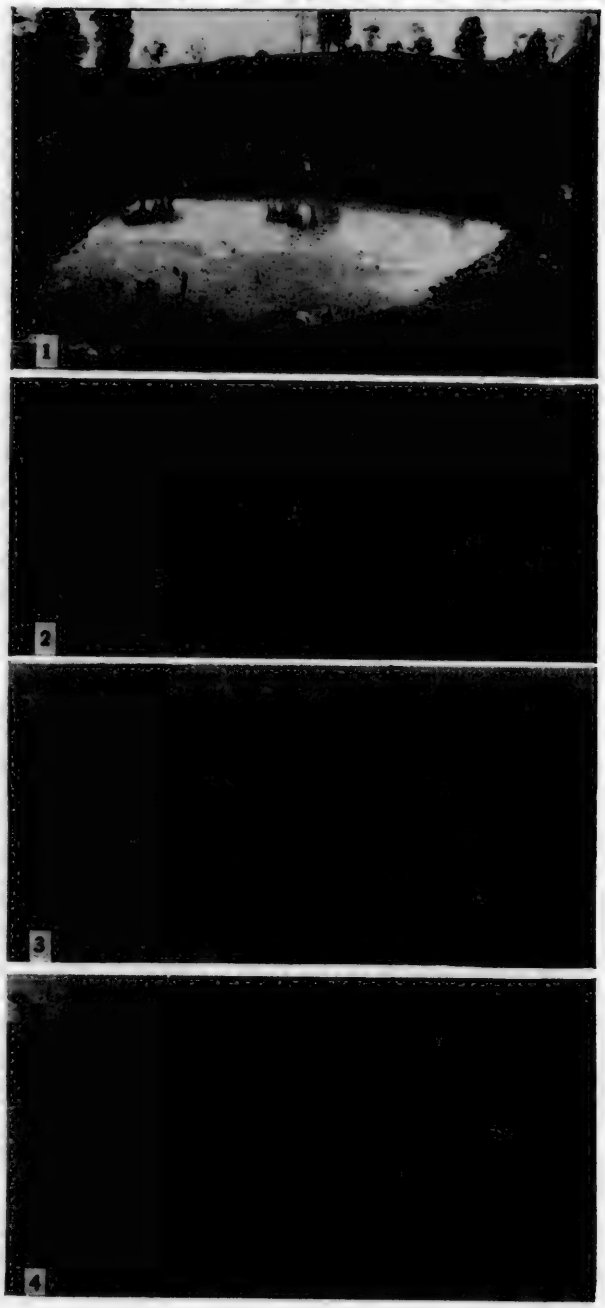
John Dawkins of Lewisburg, West Virginia, constructed a small stock water pond in December, 1956, using all common techniques to reduce the excess seepage that was sure to occur in the limestone soil. The pond never held more than eighteen inches of water and that seeped out rapidly. On May 15, 1957, the pond was dry as a chip—a complete failure. On that day Dawkins treated the soil inside the pond with sodium tripolyphosphate. By September 24 the pond was holding more than four feet of water. If it had not been for this pond, Dawkins would have had to haul water or not use the pasture.

It cost Dawkins $11.55 for enough chemical to treat the pond (Figure 1). Including the cost of machinery, materials, and labor the job can easily be done on the average farm pond for less than 1c per square foot. The Greenbrier farmers pay $11.55 per hundred pounds for the polyphosphate through their own Greenbrier Valley Soil Conservation District.

Sodium tripolyphosphate mixed with moist soil and compacted causes the soil to lose its granular structure and become more dense. The soil density can be increased by compaction alone, but limestone soils lose density rapidly when saturated with water. Polyphosphate changes the chemical makeup of the soil; the treated layer is unaffected by water. After treatment and compaction are completed, the soil particles are snugged so close together that water seeps through very slowly, if at all.

To seal a pond you begin by smoothing the inside of the reservoir and by removing any organic matter and topsoil. Cover rock outcrops or other bad areas with 18 to 24 inches of as good subsoil as is readily available. Then pulverize six inches of the soil to be treated with an ordinary farm disc or scarifier and broadcast granulated sodium tripolyphosphate at the rate of 1 pound per 20 square feet over the area (Fig. 2). Mix with the disc (Fig. 3) and then compact thoroughly with a sheepsfoot roller or farm tractor (Fig. 4). Usually a 6-inch layer is treated. Where a 12-inch treated layer is desired, do the job in two 6-inch lifts.

Figures 1 through 4, see text for explanations.



E. V. Wickline is soil conservationist, Soil Conservation Service, located in Lewisburg, West Virginia.

Thorough compaction at the right moisture content is essential. A sheepsfoot roller does an excellent job, although a farm tractor may do an acceptable job also. The soil should have just enough moisture so that a handful barely sticks together when squeezed tightly. The polyphosphate releases water in the soil thus the job can easily become too wet to handle. In cases where the soil to be treated is too dry, sprinkle the treated layer with water during the mixing operation. This must be controlled carefully; soil which is too wet will not compact.

After installing a liner, mulch the entire treated area with straw. This prevents cracking as well as gullying on the sides which would cut throngh the liner if allowed to go unchecked. Riprap with heavy stone any points where concentrated volumes of water flow into the pond. This prevents cutting through the liner at these critical points. Fence the pond so that cattle tramping is kept to an absolute minimum.

Water in a treated pond will stay muddy for many weeks because the extremely fine particles are suspended as a result of the dispersing action of the chemical. Don't worry, it will clear.

Only time will tell whether or not the effect of treating the soil in a pond basin with sodium tripoly is permanent. Farmers on the limestone soil have been plagued with livestock water shortages so long that the common reaction is, "So it might not be permanent; for no more than the job costs, I'll gladly treat the pond again if it needs it!"

Figure 5. Sodium tripolyphosphate may not prove to be a permanent sealer, but it is worth the nominal cost to get usable water.

Forest Type Affects Snowpack

ROGER R. BAY

In northern Minnesota, thousands of acres of brush and undesirable hardwoods are being planted to pine and other conifers. Snowfall in this area amounts to one-fifth of the total precipitation. The conversion of forest cover from hardwoods to pines can influence snow accumulation and melt which in turn may affect soil moisture, ground water recharge, and stream discharge.

ABOUT 20 PER CENT of the total precipitation in northern Minnesota falls as snow. This amounts to approximately 5 inches of water each year. Forest cover, as it affects snow accumulation and spring melt rates, can have an important influence upon this portion of the annual precipitation. This is especially important when conversion from hardwoods to conifers is being considered—as in northern Minnesota, where aspen stands occupy large areas of land suitable for pine. A study made during the winter of 1956-57 gives some indication of the effects of type conversion on snow accumulation and melt.

Stands selected for this study were located on the Pike Bay Experimental Forest near Cass Lake, Minn. In 1937 a portion of a large area of brush and inferior aspen was planted to red pine. The site was prepared by cutting the hardwoods and disking the area thoroughly. A 4 x 4-foot spacing was used. After the most recent thinning—in 1956—746 trees per acre were left, with a total basal area (cross-sectional area of stem at breast height) of 94 square feet. The residual trees averaged 32 feet in height and 4.4 inches in diameter.

Roger R. Bay is a research forester at the Grand Rapids, Minn., field office of the Lake States Forest Experiment Station. The Station is maintained at St. Paul 1, Minn., by the Forest Service, U. S. Department of Agriculture, in cooperation with the University of Minnesota.

Ten snow-depth and water-content measurements were collected at each sampling date from Feb. 5 through April 26 in the plantation area and in the adjacent aspen-brush area. Measurements were taken at closer intervals during the spring to better define the rate of melt. A Mt. Rose snow sampler and tubular scale were used to collect data. Shallow snow depths in late spring were weighed with a more sensitive scale.

During the period of accumulation, the coniferous plantation canopy prevented the formation of a deep snowpack, while on the other hand the crowns in the aspen-brush area intercepted little snowfall. However, once spring break-up began, the role of the plantation canopy was reversed, and snow disappeared more quickly from the brushy aspen stand, which was open to the warm sun. Thus, the canopy which acted as a barrier to snow accumulation under the plantation later acted as a barrier to sunlight and wind movement, two important factors which influence snow melt. This is shown in Figure 1.

Water content of the snowpack is shown in Figure 2. The rate of melt was considerably less in the red pine plantation. From March 22 to April 17, water content decreased 0.9 inch in the red pine and 2.6 inches in the aspen-brush cover. This corresponds to about 0.03 and 0.1 inch of water per day, respectively. Because of a period of extremely warm temperatures followed by a heavy rain, the melt period was abruptly ended in mid-April.

Besides being desirable in terms of forest management, conversion of brushy, inferior aspen areas to red pine plantations may also result in a greater accumulation of snow late in the spring and a prolonged melting of the snowpack.

Other factors, such as the influence of plantations on ground freezing and soil-moisture recharge, are also under study. They will help tell the full effect of conversion plantings on the water regime.

Figure 1. Snow depth under a red pine plantation and an aspen-brush stand.

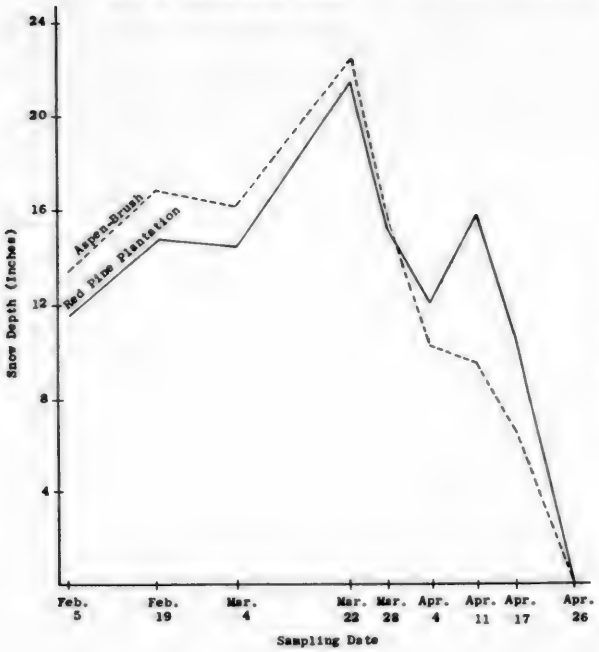


Figure 2. Water content of the snowpack under a red pine plantation and an aspen-brush stand.

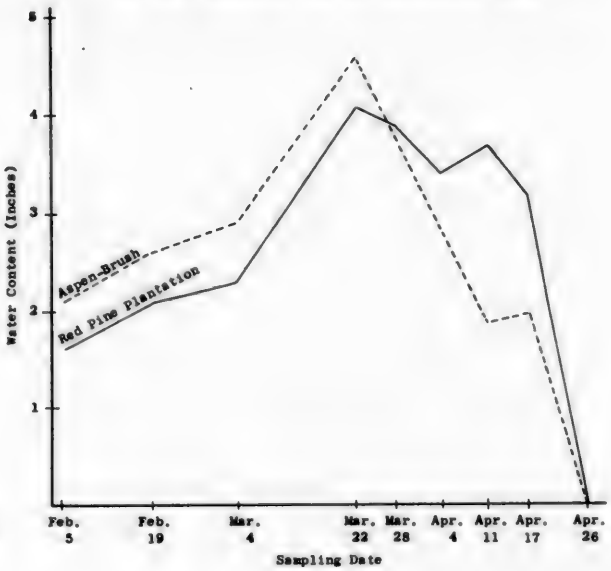


PHOTO CREDITS

U. S. Forest Service: Cover photograph; 102; 103; 107 top left and right; 108; 109 bottom left and right; 130.

Soil Conservation Service: 104 top left and right; 105 top right and bottom right; 110; 111 top three and bottom right; 112; 122; 125; 126; 127; 128; 129; and 140 bottom.

Unknown: p. 104 bottom.

Leon J. Sisk: Art work, p. 105 bottom.

Ramon Kent: 140 top.

Allis-Chalmers: 116.

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Grassland Reservations

V. E. SHELFORD

EUROPEANS who have come to occupy much of North America are a deciduous forest people. Like many large animals they have a preference for forest edges and openings. They like a shade tree at the edge of a grove near water. This is borne out by the tree and shrub plantings about residences. Residences of the grassland area accept the prevalent idea that all grass must be viewed as hay or forage. The politicians are afraid to advocate anything else or think it is to their advantage to follow the prevalent idea and devote *all* grass to practical use.

Experience indicates that the average citizen of the grassland area sees little or nothing interesting or esthetic in grasses or the associated broad-leaf plants (forbs). The Phillips Petroleum Company's colored plates of grassland plants may help give an esthetic value to our prairie flora.

The grassland animals on the other hand have a great appeal for the average citizen. The writer cannot conceive of a grassland national monument without a prairie dog town, prairie chickens, jack rabbits, coyotes, badgers, ground squirrels and kit or swift foxes. The poisoning of animals such as rabbits and small rodents has been very general and quite natural from the viewpoint of agriculture. It is proper within limits if based upon a scientific background. In 1904 the writer accompanied D. E. Lantz of Manhattan, Kansas, on a visit to check the effects of the 1903 rabbit and prairie dog poison campaign in south central Kansas. Probably no one will again see such hoards of rabbits in Kansas as this writer saw running parallel to the railway train in an area where Lantz had not operated. However, *not every acre needs to be subjected to poison;* populations of all the species mentioned can be controlled in areas of state park proportions, reserved for historical, esthetic and scientific use. There can even be failure of these species to survive when populations are very small. There may be difficulty in reintroducing the animals of the covered wagon days in an area of grassland national park proportions.

Dr. V. E. Shelford is one of America's well-known ecologists. He is chairman of the Grassland Research Foundation, Vivarium Building, Wright and Healey Streets, Champaign, Illinois.

More recently the Nature Conservancy, 4200 22nd St., N.W., Washington 6, D. C., is undertaking a vigorous program to insure the setting aside and use of many types of "natural areas", including grasslands. Paul Bruce Dowling is the Conservancy "mid-America" representative. Correspondence concerning prairies and virgin grasslands should be addressed to him at 9827 Clayton Road, St. Louis 17, Missouri. Dowling has already been in touch with some Society members in the Midwest and Northcentral States, but will be glad to hear from others knowing of areas that might be preserved.

What the grassland regions need is:

1. Many small roadside and similar parks with shade trees and a small area of grassland adjacent. In as many as practicable of these areas, species of grasses and forbs should be labeled to further knowledge of grass.

2. Many small grassland reserves in various parts of each state. Most states and state educational institutions get farms as gifts. The grassland on them should provide reservations for scientific observation and research. The states should be urged to purchase outstanding grassland tracts.

3. A tract of grassland within a few miles of the campus of each major and some lesser institutions of higher education. These would serve for demonstration to students, for thesis research, and for the research of professors and others. The University of Kansas has persuaded a granting body to supply the funds for such a purchase. A virgin-sod grass area is being purchased in Missouri.

4. A large national monument to depict the plains flora and fauna and the covered wagon days to the traveling public.

5. A national grassland experiment station with some land on which studies of grass and grassland animals in relation to soil and weather can be made. It should be within easy reach of the national monument which can serve as a check area on all practical manipulations over a large area.

6. Pure research on grasses and associated forbs such as was carried out at the University of Nebraska and Fort Hays State College (Kansas) from 1920 to 1950 has important practical bearing on range problems in spite of the the fact that no such problems were the target of the work. Such work on both plants and animals should be encouraged and the published results popularized. This should do much to make reservations for research as natural checks or controls easier to secure.

From 1932 through 1941, a program such as is described under 2 to 6 above was advocated by a committee of the National Research Council. This group also cooperated with the National Park Service in the matter of the national monument as a check area. Just as the matter was reaching the top levels in Washington, the war broke out and the efforts gradually ceased. In more recent years, sporadic efforts toward grassland preservation have been made but it still remains for an effective program to be undertaken.

Book Reviews

SOIL/THE YEARBOOK OF AGRICULTURE/ 1957. U. S. Department of Agriculture. *U. S. Government Printing Office, Washington 25, D. C. 784 pages, illus., indexed, glossary. 1957. $2.25. (Reviewed by* Louis Thompson, *Ames, Iowa.)*

The 1957 Yearbook of Agriculture, "Soil," is an important contribution to the literature of soils. Anyone interested in reading about soil management principles and practices will want a copy of this book for his library. It will prove to be a very useful reference for technical and non-technical personnel. To read the list of contributors is like reading a "Who's Who in Soils." The book is organized in eight sections, including *principles, fertility, practices, soil care, moisture, systems, regions,* and *special uses.* The book also contains a *glossary* of terms commonly used in soils literature. Where the 1938 Yearbook of Agriculture, "Soils and Men," stressed soil classification and the technical aspects of soil science, the 1957 edition emphasizes soil management.

THE DARK MISSOURI. *By* Henry C. Hart. *The University of Wisconsin Press, 811 State Street, Madison, Wisconsin. 250 pages, illus., indexed. 1957. $6.00. (Reviewed by* H. Wayne Pritchard, *Des Moines, Iowa.)*

The development of the resources in the Missouri River Basin, management of the river, and much of the intrigue in the history of the Northern Great Plains is brought into focus by this book. It has a sinister title that could well belong to a novel rather than to a factual and technical report.

Dr. Hart believes, and rightfully, that the citizens of the United States who have spent nearly two billion dollars of public money to control the floods, drouths, and related problems of the basin—without complete and satisfactory results—should be informed about the political and technical efforts of the past and present.

One of the great river valleys of America, covering one-sixth of the United States, its variance in climate and topography has led to drouth in some years and floods in others. There have been questions of whether certain lands should be grazed or cultivated, or whether irrigation or dry land farming should prevail. All of this Hart relates in detail including the manner in which irrigation has been brought to the area. He carefully outlines the history from Indians and buffalo to the modern progressive Great Plains country and his geologic and geographic descriptions are excellent.

The "nerve center" of the basin—and a problem—is the Missouri River, longest in the United States. A problem because of floods, meandering courses, and an annual export of 400 million tons of the soil of the Plains and the foothills to the Mississippi valley. All the problems are interrelated.

Snag removal on the Missouri River as early as 1838 by the Corps of Engineers, to aid navigation, started the long parade of expenditures and assistance by many agencies. Each succeeding step (in 260 pages) up to the present time with the installation of many structures under the Pick-Sloan Plan is told.

Not only does Hart give in detail the governmental agencies and the work of the states through such groups as the Missouri Basin Inter-Agency Committee but he relates the efforts of local groups through such organizations as the Mississippi Valley Association, and earlier efforts to organize the people. He tells of other plans recommended—such as a Missouri Valley Authority that was rejected.

A person depressed by past failures to coordinate the various forces in the basin will not be encouraged by the book to expect any present-day miracles in coordination. Hart does point out that the one thing that unites the basin is the flow of water . . . that in any future and final plans (if such can be developed) water plans must be directed toward ends that surpass ordinary river-use. Such plans would include cheaper transportation, sustained farm production, stability of economic opportunity, high incomes. Hart believes that water planning is the core to the future of the basin, justifying itself through linkage to other planning, e.g., flood and pollution control, water supply for cities and farms, a navigation and hydroelectric generation—all of which must be viewed and managed as one.

Hart looks at the Missouri Basin as a panorama of a multitude of problems and their attempted solution. Not only does he examine the resources and their management but he examines the people, and says of them, "Like other Americans close to the process of civilizing the wilderness, people in the Missouri Basin have an affinity for booms."

Students, technicians, and citizens, interested in the Missouri River Basin, will want this book. This includes *Society* members. The bibliography of notes from which Dr. Hart gathered much of his data covers twenty-three

pages. The book is well indexed. While easy to read, a larger type would have been preferable.

FLAT TOP RANCH—THE STORY OF A GRASSLAND VENTURE. *Edited by* B. W. ALLRED *and* J. C. DYKES *with chapters by Louis Bromfield and others. University of Oklahoma Press, Norman. 231 pages, 35 photographs; Appendix A/Flat Top Vegetation; Appendix B/The Contributors; Index. 1957. $4.00. (Reviewed by* MARTIN H. MEYER, *Des Moines, Iowa.)*

The idea of the book originated with Louis Bromfield. But death intervened and the project was completed by J. C. Dykes and B. W. Allred. Included in the book is a preface by Charles Pettit, owner of Flat Top Ranch, and seventeen chapters dealing with ecology, geology, range management, animal husbandry, and wildlife management.

The book is extremely readable. It is a story of Mr. Pettit and his ranch and shows the personality and character of a man who has devoted his life and resources to furthering the cause of sound soil and water conservation. The reader is made to feel that he is taking part in the ranch enterprise. It might be said that this is a range handbook of one ranch that could very well be extended to ranches throughout the Southwest.

The owner of Flat Top Ranch is a "fanatic" about stopping water losses and improving grass stands and soil fertility. The ranch has long been a cooperator with the Bosque Soil Conservation District. On the 17,000 acres of Texas rangeland, Mr. Pettit has 24 wells and has built 18 dams. The benefits of the dams and their effect on water flow in the East Bosque are easy to see. After five and a half years of short rainfall, water was flowing continuously where before, even in normal rainfall years, the stream was dry a good part of the year. Mr. Pettit has a real affection for this impounded water. He says that "an acre of water is worth much more to me than an acre of land."

The ranch, dedicated to the improvement of Herefords, and through selective breeding, has developed Herefords that are in great demand as breeding animals. Pettit had a basic type in mind when selecting for his foundation herd. He was not thinking in terms of a fitted animal, but in terms of the utility or range animal. On a herd lifetime average, his large cows produced one and one-half more calves and the average weight of calves were one hundred pounds more than calves from compact cows. His philosophy may be expressed as follows: "It is to the detriment of the breed to follow 'fads and fancies,' and we are treading on dangerous ground when we—by design or carelessness—create a breed within the breed."

Much more could be said about Flat Top ranching. But to Charles Pettit, carrying out a definite and coordinated program is the only way to operate a ranch.

The book is rewarding and would appeal to people interested in soil and water conservation. Flat Top Ranch is a step toward the utopia of conservationists, a ranch where almost everything is done right.

The editors and four of the authors are members of the *Society*. The late Louis Bromfield was a member.

ATOMIC ENERGY IN AGRICULTURE. *By* WILLIAM E. DICK, *Published by Philosophical Library, New York, N. Y. 150 pages. 16 Plates, 15 Figures, 8 Tables. 1957. $6.00. (Reviewed by* LYLE T. ALEXANDER, *Washington, D. C.)*

This small book it too technical to be of interest to the layman and too general to be useful to the serious scientist in the specific fields covered. It does, however, give an excellent evaluation of the peaceful uses of atomic energy in agriculture for scientists not directly concerned with the subject matter. For the scientifically inclined layman of philosophical bent, this book is a gold mine of well-presented information, particularly in genetics and photosynthesis.

The chapter on genetics not only explains the application of radiation to the development of new plant materials, but also explains the basic scientific principles that make man-made genetic changes possible. The chapter on photosynthesis is somewhat more difficult, but if the reader does a bit of work here, he will be rewarded with an understanding of the state of knowledge of the most fundamental of all chemical reactions. The third chapter covers the use of isotopic tracers in research on the plant nutrient elements. At times, the terminology is highly technical, but the material is otherwise easy to read. The fourth chapter deals with the tracing, control and extermination of insects. The potential benefit to mankind in this application is great. The short fifth chapter covers a few interesting experiments in the field of forestry, and some of the possibilities for future accomplishments. The last chapter describes the work that has been done in the field of food preservation. While not unduly pessimistic, the author indicates the many hurdles that must be surmounted before a widescale use can be made of fission by-products for the preservation of foodstuffs. For its size, the book is rather expensive.

THE ECONOMICS OF UNDER-DEVELOPED COUNTRIES. *By* PETER T. BAUER AND BASIL S. YAMEY. *University of Chicago Press, Chicago, Illinois. 271 pages, index. (Foreword by C. W. Guillebaud and M. Friedman.) 1957. $2.25. (Reviewed by* L. G. HINES, *Hanover, N. H.)*

One of the most rapidly growing fields of economic study since World War II has been the examination of

economically backward or underdeveloped areas of the world. Stimulated by the division of the world into camps of "we" or "they", concern over raising the economic states of other nations has become an issue of national self-interest as well as humanitarian endeavor. The present work, by two English authors, is published as a title in the distinguished series of Cambridge Economic Handbooks. This series, initiated by the late John Maynard Keynes, is "intended to convey to the ordinary reader and to the uninitiated student some conception of the general principles of thought which economists now apply to economic problems."

The Economics of Under-developed Countries falls far short, however, of the high standard set by the earlier publications in the Cambridge series and fails in the announced purpose of communicating effectively with the non-economist. The book seldom rises above a pedestrian plea for the use of the "pricing system" (or private market mechanism) to facilitate the development of backward economies. To the extent that the book makes a contribution by the economist to the analysis of problems of underdeveloped countries, it is the questionable one of applying a narrow conception of economic analysis to the problems of such areas. Since the economic problems of underdeveloped countries are not significantly different in kind from those of other countries, but primarily dissimilar in terms of the stage of historical evolution, the major interest in this work centers around the descriptive material that constitutes the unique feature of this subject.

READING THE LANDSCAPE. *By* MAY THEILGAARD WATTS. *The Macmillan Company, 60 Fifth Ave., New York 11, N. Y. 230 pages, illustrated, indexed, references at the end of each chapter. 1957. $4.75. (Reviewed by* D. E. WADE, *Des Moines, Iowa.)*

Mrs. Watts is naturalist at the Morton Arboretum at Lisle, Illinois. A number of years ago she was exposed to the teachings and field methods of a pioneer ecologist, Dr. Henry C. Cowles of the University of Chicago.

Her book is a series of "adventures into the field that is called ecology". From the first chapter on *"the forests of the Great Smoky Mountains"* and on through others on *the prairie, lake to land successions, quaking bogs, small streams, traveling islands, changes in forests from Illinois to Wisconsin, sand dunes of Indiana, plains to timber line in the Rockies, above timber line in the Rockies, tree rings, airplane view of man and land,* and *fashions as an ecological factor,* Mrs. Watts discloses many of the rudiments of "reading the landscape". Her book certainly will be relished by teachers and camp and youth leaders, and perhaps by some of the most erudite ecologists and field conservationists.

Interpreter Watts joins company with a brave band of ecologists or "interpreters" of the landscape and waterscape who have dared to popularize ecology: Aldo Leopold, Edward Graham, William Van Dersal, Bernard Frank, Charles Elton, William Albrecht, William Vogt, F. Fraser Darling, A. G. Tansley, Jean-Paul Harroy, Durward Allen, Olaus and Adolph Murie, Rachel Carson, Walt Disney, R. W. Eschmeyer, Michael Graham, E. F. Ricketts, R. E. Coker, Marston Bates, R. H. D. Boerker, H. A. Hochbaum, Charles W. Schwartz, A. L. Schorger, Paul Sears, Joseph Grinnell, Abelardo Moreno, Enrique Beltrán, H. L. Shantz, Paul Errington, Roberts Mann, Benton MacKaye, Freeman Tilden, Howard Zahniser—just to mention a few who have made notable contributions to the art and science of ecology or particularly its interpretation.

Some day we shall arrive at an educational position wherein *ecology* will be ranked with *reading, writing* and *arithmetic* as one of the fundamental disciplines to be learned by all. "Reading the landscape" is great fun, but in stern reality *it is the art and science of survival.* It's quite a serious business. Mrs. Watt's book may open the door a bit wider so that educators begin to see the significance of ecology from the early grades through college graduate schools and adult education. Immediately, however, her book should find much use in the multitude of youth camps throughout the nation and in the many summer conservation-education workshops for teachers.

AMERICA'S NATURAL RESOURCES. *Edited for the Natural Resources Council of America by* CHARLES H. CALLISON, *National Wildlife Federation. The Ronald Press Company, 15 East 26th Street, New York 10, N. Y. 211 pages. Appendices: A Policy for Renewable Natural Resources; The Contributors. Index. 1957. $3.75. (Reviewed by* H. WAYNE PRITCHARD, *Des Moines, Iowa.)*

This book is sponsored by the Natural Resources Council of America, a nonprofit, nonpolitical, organization of forty national and regional associations (including *SCSA*) interested in the conservation and wise use of the renewable natural resources. It was written to provide an informed approach to the problems of conservation for the responsible citizen.

The appeal and strength of this book is in the subject matter selected for each author and can best be reviewed by listing the chapter titles and the names of the authorities responsible:

"Conservation: An Ecological Approach"—Shirley W. Allen, Professor Emeritus of Forestry, University of Michigan.

"Renewable Resources and Human Populations"—

Fairfield Osborn, President, The Conservation Foundation.

"Soil"—Firman E. Bear, Professor of Agricultural Chemistry (Retired), Rutgers University.

"Water"—Harold G. Wilm, Associate Dean, College of Forestry, University of New York.

"Grasslands"—David F. Costello, Chief of the Division of Range Research, Pacific Northwest Forestry and Range Experiment Station.

"Forests"—Henry Clepper, Executive Secretary, The Society of American Foresters; and Lowell Besley, Chairman, Woodlands Department, Pulp and Paper Research Institute of Canada.

"Wildlife"—Joseph J. Shoman, Chief of the Division of Education, Virginia Commission of Game and Inland Fisheries.

"Fish"—Albert S. Hazzard, Assistant Executive Director, and William Voight, Jr., Executive Director, Pennsylvania Fish Commission.

"Parks and Wilderness"—Howard Zahniser, Executive Secretary, The Wilderness Society.

"Land Use Principles and Needs"—Edward H. Graham, Director of the Plant Technology Division, Soil Conservation Service.

"Needed: A Natural Resources Policy"—Ira N. Gabrielson, President, The Wildlife Management Institute.

Five of the thirteen authors are members of *SCSA. Society* members should find this book useful when contacted by individuals wanting information about some of the natural resources of America.

THE BOOK OF THE EARTH. *Edited by* A. C. SPECTORSKY. *Appleton - Century - Crofts, Inc., New York. 448 pages, illustrated. 1957. $12.50. (Reviewed by* L. G. HINES, *Hanover, N. H.)*

For magnificence in quality of printing and illustrations, **The Book of the Earth** has no close rival. It is a masterpiece of typographical design and printer's skill.

This large and profusely illustrated work consists of six major collections of articles and excerpts from fiction and non-fiction dealing with the earth or using the earth as a backdrop. Although the topics of these selections range widely, there is always more than an artificial connection with the earth as the elemental source of man's progress.

Some of the passages are well-known and frequently quoted, while others—although old—are fresh and new. You will find here such simple beauty as that of the writings of Alan Paton:

There is a lovely road that runs from Ixopo into the hills. These hills are grass-covered and rolling, and they are lovely beyond any singing of it. The road climbs seven miles into them, to Carisbrooke; and from there, if there is no mist, you look down on one of the fairest valleys of Africa. About you there is grass and bracken and you hear the forlorn crying of the zimkulu, on its journey from Drakensberg to the sea; and beyond and behind the great river, great hill after great hill; and beyond and behind them, the mountains of Ingeli and East Griqualand.

The grass is rich and matted, you cannot see the soil. It holds the rain and the mist, and they seep into the ground, feeding the streams in every kloof. It is well-tended, and not too many cattle feed upon it; not too many fires burn it, laying bare the soil. Stand unshod upon it, for the ground is holy, being even as it came from the Creator. Keep it, guard it, care for it, for it keeps men, guards men. Destroy it and man is destroyed.

The number of authors and the diversity of topics are too great to catalogue in a brief review, but the major division and representative contributors are: **Men Venture on the Earth**—George Stewart, William Beebe, Victor Hugo, Ivan Sanderson, Wallace Stegner; **Men Live and Work on the Earth**—Pearl Buck, John Steinbeck, Jesse Stuart, Walter Macken, Leo Tolstoy, H. E. Bates; **Men Against the Earth**—Theodore Dreiser, Mary Austin, Vardis Fisher, Samuel Clemens; **Men Study the Earth**—Donald Culross Peattie, Edwin Way Teale, J. Henri Fabre, John Muir, W. H. Hudson, Joseph Wood Krutch; **Men Fight on the Earth**—T. E. Lawrence, Bruce Catton, Homer, Erich Maria Remarque; **Men Wonder at the Earth**—Kay Boyle, Voltaire, Cervantes, John P. Marquand, Louis Bromfield.

No reviewer can form a single critical judgment upon writings so numerous and divergent as those brought together in **The Book of the Earth.** On the whole, the selection is outstanding. Those that are familiar are of such excellence that it is good to read them again; the unfamiliar yield both the pleasure of discovery and the appreciation of new beauty and knowledge.

WATER, OUR MOST VALUABLE NATURAL RESOURCE. *By* IVAH GREEN. *Coward-McCann, Inc., New York. 1958. 96 pp., illus. $3.50. (Reviewed by* BEN OSBORN, *Washington, D. C.)*

Each new publication that aims to awaken the public to the importance, the uses and management of water is to be welcomed. This little book is one of the most attractive to be added to this rapidly growing list. It uses many large, clear photographs and plenty of white space with a pleasing type. Reproduction is by photo offset.

The book obviously is intended for school use, and that is its primary value. As a separate item for an adult reader it is not complete enough to give a well-balanced understanding of the subject. It should serve a good purpose, however, as part of the materials used to teach conservation in the schools.

Ivah Green is a member of the *Society* and served on several committees.

News Notes

President's Column

THE MARCH COUNCIL meeting of the *Society* lasted two and one-half days and two long evenings. As usual, there was hardly enough time to consider all necessary business. One relaxing and enjoyable period was a short dinner meeting with members of the Iowa chapter. This was the first council meeting held at Des Moines since 1952. It enabled the *Society's* administrators to visit the national office to observe at first-hand the many details carried on there. The council is better able to evaluate management problems as a result of this visit.

Russell G. Hill

Most *Society* committees submitted a progress report. A number of specific recommendations were presented for council consideration.

The annual meeting local arrangements and program committees showed that they are working to make the Asheville meeting in October the best yet. An annual meeting program theme was adopted, namely, **Land and Water for Tomorrow's Living.**

Someone once said that we should continually think about the future since that is where we will spend the rest of our lives. Many land use problems still exist in spite of progress to solve them. There will be even more complex ones arising during the next few years. The *Society* must recognize these trends, anticipate the problems likely to occur and be out in front with possible solutions. It must be bold and aggressive, although admitting that such a procedure occasionally may result in some mistakes. We cannot wait to see which direction the band is going and then get in front to lead it—someone else may be there.

Recent *Society* annual meetings have dealt with forestry, watersheds and water problems. It is time again that we examine conservation planning wherein basic interrelated resource management is brought to bear on a land unit. Some of our public programs have strayed from this objective. Nearly 20 years of intensive farm conservation planning and application has materially helped to improve land use management in the Southeast and to raise the economic standards of its people. It is wise that we again examine this and similar trends in light of tomorrow's living.

The Asheville annual meeting program should be challenging to all of us.

Your council decisions dealt with, among other matters, finances, an expanded awards program, chapter activities, and international conservation projects. A few words should be said about another major council decision. The Organization and Policy committee under Roy Hockensmith's leadership has been working about two years to bring our Constitution and By-Laws up-to-date. The *Society's* activities have changed considerably since initial adoption. Likewise, future planned activities require other legal adjustments. One of the proposed changes deals with establishing a "Development Fund" which will enable the *Society* to accept donations, bequests and gifts to carry on activities now beyond its ability.

The new By-Laws recommendations will also allow Canada to have representation on the council. This change recognizes the growing Canadian membership in the *Society*.

The council has carefully reviewed these and other proposed changes and urges the *Society* membership to adopt them.

The *Soil Conservation Society of America* is a co-sponsor of the National Watershed Congress (September 29 to October 1, 1958) and also of the agriculture section in the annual conference of the American Association for the Advancement of Science (December 26-31, 1958). This is part of our cooperation with related groups.

—RUSSELL G. HILL, *President.*

L-R (below): Mrs. "Sondra" Porter and Mrs. "Pauline" Skinner are on full-time. When the going gets rough Mrs. D. L. Messer helps part-time. Miss Sharon Hilpipre, not shown, is on part-time until she finishes business college training. These are the girls that help process the affairs of the *Society* in its national office. Recently in March the Council members had an opportunity to meet these excellent staff members.

John W. Wright, work unit conservationist, SCS, at Winfield, West Virginia, ended a talk at a meeting with a poem he had written. John was most humble in submitting the poem, suggesting that it might be used during Soil Stewardship week . . .

Joy Is Ours

Are we proud of man's achievement
When the storms around us roar?
Or, are we laden with bereavement,
Looking through the sagging door?

Watching creeks and rivers flowing,
Heavy laden waters they
With our topsoil. And us knowing
This is happening every day.

Can we say without some feeling
Of remorse, of guilt, or sin,
That we have guarded without stealing
From the future of our kin?

Look around you, hear the calling!
Corn is withered, cattle groan.
Rain and snow have ceased their falling.
Land once fertile, bares the stone.

Surely, hearts beat high with pleasure,
When the green fields we behold.
And joy is ours in untold measure,
Bringing in the harvest gold!

Then, take heart! Awaken people!
Love and cherish all the land.
Like your churches with their steeples,
Be ye fingers of God's hand.

Molding, shaping, building, serving,
All who would their efforts blend,
Toward the one goal of conserving,
God's green earth until the End!

JOHN W. WRIGHT

Another Society Publication

Suggestions to Teachers in Using the Booklet, The Wonder of Water, is the newest *Society* publication available on sale from the national office.

This eight-page processed publication prepared by the JOURNAL editor and with the aid of some thirty members and educators throughout the nation, contains "Some Guiding Principles"; "Subject-Matter Areas"; and a brief list of sources of aid and some selected references.

The subject-matter areas include *Social Studies; Geography; Science; Mathematics; English; Art; Shop Courses; Vocational Agriculture; Physical Education; School and Youth Camping;* and *"Joint Efforts."*

The guide contains an unusual number of suggestions that may help teachers of grades 6 through 12 make more effective use of the booklet, **The Wonder of Water.**

Single copies are 25c; 5 to 10 copies 20c each; over 10 copies 15c each. Order should be sent to 838 Fifth Avenue, Des Moines 14, Iowa.

Society members and particularly chapters should make special efforts to get the new *Society* publication circulated and in the hands of purchasers of **The Wonder of Water.** This would be especially effective when it is known that **The Wonder of Water** was being purchased for distribution to a school system or group of students.

C.E.A. Meeting Announced

The fifth annual conference of the **Conservation Education Association** will be held at the University of Utah, Salt Lake City, August 18-21, 1958.

Participants will include educators from all teaching and administrative levels, leaders of youth and adult groups, representatives of industries and public and private agencies and organizations concerned with the conservation of natural resources.

Conference theme *"Conservation Education at the Grass Roots—How Can We Do It Better"* will lead to analyses of techniques, tools, and what is needed at respective levels.

A field trip over the famous Davis county watershed on the Wasatch Range will depict what has been done to stabilize what once was a frightening situation of rock and mud flows. Erosion so destructive that valley farms could not be insured. Today these farms are productive and secure with a steady flow of water.

Further information can be obtained by writing Dr. Stanley D. Mulaik, Biology Dept., University of Utah, Salt Lake City, Utah. Meeting is open to the public.

ASAE Fifty-First Annual Meeting will be held on the Santa Barbara campus of the University of California, June 22-25. Many SCSA members will be attending the American Society of Agricultural Engineers meeting.

The National Grange will hold its annual session November 10-19, 1958, in Grand Rapids, Michigan. This will be the Grange's 92nd annual meeting.

Chapter Achievement Contest

One way to improve your chapter programs is to enter the *Achievement Contest.* In so doing you will be sharing with all the others.

Entries are due in the offices of your regional council member by August 1, 1958. The regional councilman will arrange for the judging. Regional winners will compete for national honors. You can lose by *not* entering. All chapters are asked to *enter* and thus *share* achievements, however modest or tremendous they may be.

I. O. Hembre is chairman of the chapters activities committee. His address is Soils Building, University of Wisconsin, Madison 6, Wisconsin.

Delegate Session at Asheville

How can chapter programs and activities be developed? How should the year's program be adapted to the wide interests of the full membership? What is the key holding old and winning new members for the *Society?*

How can teamwork between all resources of the *Society* be further facilitated?

These and many other challenging questions will be discussed in a new-style "delegates from chapters" session, October 19, at Asheville during the annual conference of *SCSA.* Chapters are asked now to select an official delegate for this October 19 session.

Wonder of Water Distribution Grows

The *Society's* booklet, **Wonder of Water,** had been distributed to the extent of 210,716 copies by March 31. In addition many sample copies, including one to each *Society* member, had been mailed.

Minnesota and California led in the use of the booklet with orders totaling 18,560 and 17,900 respectively. Michigan and Iowa had the most orders with 22 each.

The number of sales and of copies purchased as of late March is given:

State	"WOW" Sold	No. Sales
Minnesota	18,560	12
California	17,900	12
West Virginia	11,410	6
Michigan	10,635	22
North Dakota	10,600	12
Virginia	10,400	2
South Dakota	9,000	4
Pennsylvania	7,928	10
Iowa	7,557	22
Wisconsin	7,510	16
Kansas	7,312	20
Illinois	7,140	14
South Carolina	5,930	9
Ohio	5,585	10
Maryland	5,500	6
New Jersey	5,530	2
North Carolina	5,250	5
Washington, D. C.	5,150	3
Oklahoma	4,515	8
Texas	4,300	6
Louisiana	4,200	7
New York	3,800	7
Washington	3,700	10
Colorado	3,290	3
Montana	3,200	6
Nebraska	2,885	9
Oregon	2,710	5
Foreign	2,575	8
Georgia	2,400	3
Arkansas	2,200	5
Kentucky	2,200	4
Mississippi	1,700	2
Arizona	1,600	3
Massachusetts	1,350	3
Florida	1,300	3
Tennessee	750	3
Wyoming	744	5
Connecticut	600	2
Missouri	570	4
Utah	510	2
Idaho	210	3
Indiana	200	1
New Hampshire	200	2
Maine	100	1
Alabama	10	1
Totals	210,716	303

Membership Report: New and Reinstated Members—April 1

State	1958 Quota	Enrolled Jan.-March	Over or under Quota
Alabama	50	10	—40
Arizona	30	1	—29
Arkansas	50	4	—46
California	100	14	—86
Colorado	50	0	—50
Connecticut	10	8	—2
Delaware	10	1	—9
Florida	80	7	—73
Georgia	40	8	—32
Idaho	50	4	—46
Illinois	50	10	—40
Indiana	70	11	—59
Iowa	100	30	—70
Kansas	70	18	—52
Kentucky	60	13	—47
Louisiana	30	0	—30
Maine	20	15	—5
Maryland	60	13	—47
Massachusetts	15	6	—9
Michigan	80	18	—62
Minnesota	60	10	—50
Mississippi	80	29	—51
Missouri	60	5	—55
Montana	30	1	—29
Nebraska	60	21	—39
Nevada	20	2	—18
New Hampshire	20	9	—11
New Jersey	30	0	—30
New Mexico	40	3	—37
New York	50	13	—37
North Carolina	100	20	—80
North Dakota	100	8	—92
Ohio	70	17	—53
Oklahoma	80	25	—55
Oregon	50	4	—46
Pennsylvania	50	7	—43
Rhode Island	10	0	—10
South Carolina	52	8	—44
South Dakota	80	54	—26
Tennessee	70	73	+3
Texas	100	7	—93
Utah	20	12	—8
Vermont	20	26	+6
Virginia	80	30	—50
Washington	50	18	—32
West Virginia	70	26	—44
Wisconsin	70	10	—60
Wyoming	40	2	—38
Puerto Rico	5	0	—5
Washington, D. C.	50	2	—48
Canada	50	12	—38
Foreign	120	34	—86
Misc.	100	2	—98
NATIONAL GOAL	2,910	681	

CHAPTER NEWS

Welcome to New Chapters

A total of 101 *SCSA* chapters have received charters, although some chapters have combined with others. The latest to be chartered include:

Southeastern Oklahoma—Roy A. Craft, chrm., Box 272, Hugo, Okla.

Olympic View—Vern R. Nelson, chrm., 703 S. 16th, Shelton, Washington.

Oregon—Oke Eckholm, chrm., 7845 S.W. Walnut Lane, Portland 1, Oregon.

Northeastern Kentucky—Hugh B. Morrison, chrm., Box 387, Grayson, Ky.

Andrew Jackson—W. J. Huddleston, chrm., Box 87 A, Tenn. Tech., Cookeville, Tenn.

The **Stillwater Chapter** of Stillwater, Oklahoma has organized a *student branch* at Oklahoma State University.

Society members who live in an area covered by one of these chapters and wish to join a chapter should get in touch with the chairman.

San Francisco Bay Chapter (California) rounds out in April a series of monthly meetings on the theme of research in the land conservation movement with a talk on "Soil and Land Use Problems in Southeast Asia" by R. Earle Storie, professor of soils, University of California. On May 3 the chapter has its annual spring field trip, families invited, and will see the San Francisco Bay model at Sausalito. At all of its meetings the public is invited. Earl Storie was a delegate to the Pacific Science Congress last November. His talk, illustrated, takes one through Formosa, Viet Nam, Thailand, India and Pakistan. The March meeting featured Dr. Walter Lowdermilk reporting (slides) on "Farming the Bible Lands on the Contour."

NATIONAL MEET TO FEATURE BANNERS

"Bring Your Chapter Banner" to exhibit during the *Society's* national conference, October 19-22, at Asheville, is part of a drive headed by Radford R. Bailey of Tarboro, North Carolina.

Facilities at the Asheville auditorium lend themselves unusually well to a display of chapter banners. If each chapter brings a banner, such a display will be most impressive and inspirational.

The cost for a banner, depending on the number of letters, is about $32.00. Banners should be ordered from the national office of the *Society*. Allow at least two weeks for delivery.

Bring your Chapter Banner.

Iowa Chapter got its first (and real nice) 1958 newsletter in March under the editorship of C. R. Ballantyne. Five special activities planned for 1958 are: 1. Student activities among high school and college groups. 2. Models of erosion control structures—will be useful for exhibits, TV shows, and education. 3. Colored slide series. 4. Photographic arts—contest will be conducted to obtain outstanding photographs. 5. Sale of *Society* publications. Iowa chapter has five sections making it easier for members to get to meetings on a sectional basis and to spread out committee assignments among a greater part of membership. Iowa is warning other top membership states that "Iowa will be top state in fifty eight." Frank Schaller, chapter chairman has held four executive committee sessions.

Northern Illinois Chapter has its war cry: *"Let's Go Great in Fifty Eight!"* One new committee has been added, Industrial Relations. The executive committee holds a regular bi-monthly meeting and this keeps the many committees active. The chapter is moving ahead on its program to get some "conservation demonstrations" set up in a state park, a strip mine area and a roadside borrow pit. [The JOURNAL will want some photo stories on these unusual projects.] The March newsletter was full of good items about members, publications, chapter activities and the Asheville meeting, October 19-22—something about "it's not too early to plan for this trip and start setting aside some money."

Hoosier Chapter (Indiana) worked out a neat approach to obtaining new members on a person-to-person basis: use a golf club instead of a fishing pole. Committees (partial list) include *membership, conservation laboratory, program, publicity, conservation speakers, and chapter delegation to national meeting* (dates, in case you've forgotten: October 19-22, Asheville, North Carolina). Monthly newsletter also contained summary of talk on terraces by Don Meyer and a "let's get acquainted column" featuring H. F. "Dutch" Helfenbein, who started with SCS in 1935. The continued need for articles for the JOURNAL was stressed, with the index in the Nov., 1957, issue showing much of the scope of subjects.

Idaho Chapter entered its second year with congratulations to a fine set of officers who got the chapter organized. C. Douglas Hole is chairman for 1958; Bruce L. Schmalz, vice-chairman and Oscar L. Onstott, Pocatello, secretary-treasurer. This chapter is resolved to get into "orbit" and will be conducting a vigorous membership drive during 1958 with a quota of 50 new members.

L-R: Harold Penner, James T. Neill, Kenneth Van Cleve and Lee Collinsworth receive the charter presentation for the Bluestem Hills Chapter in south central Kansas.

Santa Fe Trail Chapter (Kansas) is first SCSA chapter to become 100 per cent paid up on national and chapter dues for 1958.

Pony Express Chapter (Kansas) ventured over into Missouri on March 28 to visit the Carswell Manufacturing Company plant (corrugated metal culverts and fabricated drainage structures). This chapter includes in its membership farmers, soil conservationists, bankers, editors, engineers and others from 13 northeastern counties in Kansas. Following a banquet, C. E. Crews showed slides of his European trip. The chapter sold tickets on a drawing for a 35 mm. camera, but each ticket gave the buyer a SCSA emblem car sticker. The chapter *Society* banner will be displayed in each of the counties along with some of the *Society's* publications.

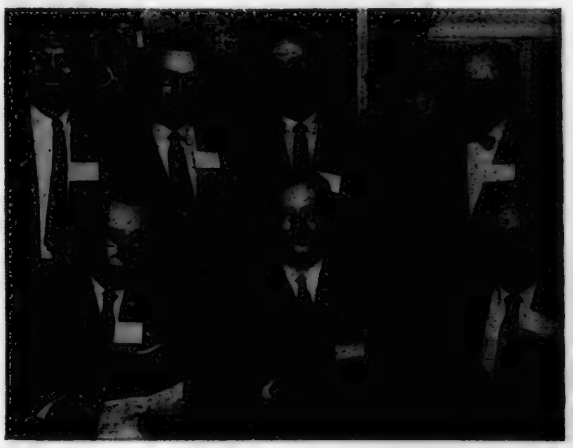
All **Maryland** and **Washington, D. C. Chapters** got together March 18 for a dinner-dance. M. E. Eyler, executive secretary, Mar-Del-Va Farm Equipment Association, and a member of the **Old Line Chapter**, was a featured speaker at the dinner.

Minnesota Chapter met February 18 as a sideline feature of the National Association of Soil Conservation Districts. Some 168 members from all sections of the country were present at a luncheon session. Russell Hill, Wayne Pritchard, Ralph Sasser and Ing Hembre spoke briefly on activities of the national *Society*. The JOURNAL editor was introduced. Ross Davies invited all to attend the 1959 conference in the Black Hills of South Dakota. Claude Ebling, agricultural agent of the Soo Line Railroad, used feats of magic to illustrate effectively leadership and direction in conservation. William Martin, chairman of the chapter, presided at this stimulating meeting. A short business session followed the luncheon.

Show-Me Chapter (Missouri) held a lively little "national" during the recent North American Wildlife Conference at St. Louis, March 3. Twelve states and Washington, D. C., were represented. Nolan Fuqua, president of NASCD, spoke briefly on the close ties of soil conservation district supervisors with all conservation agencies—private and public. The editor of the JOURNAL gave a thumb-nail sketch of the purpose and scope of the JOURNAL. Other speakers included Wayne Pritchard, past-president Edward Graham, L. L. Compton, chief biologist, SCS, Cy Kabat of Wisconsin. Howard C. Jackson presided. *The St. Louis Post-Dispatch* carried a write-up of the meeting and a photograph of Show-Me officers and guest speakers. S-M newsletter in a report on this meeting quoted some of the S-M members, with Howard Funk stating, "I was amazed at the cooperation obtained between several agencies in Wisconsin through efforts of the *Society* chapter there."

East Texas Chapter has worked out a nice program for 1958, featuring watersheds, fertility management and supplemental irrigation, fertilizers and herbicides, farm and fish pond management, a family day outing and a ladies night. Lester L. Gordon, 219 Nelson, Nacogdoches, Texas, is chairman; Roy R. Woolley, vice-chairman; R. M. Voigtel, secretary-treasurer; and G. K. Stephenson and James Valentine, directors. W. T. Moon was featured speaker at the February meeting on watershed development.

Northern New England Chapter (Maine, Vermont, New Hampshire) met in Berlin, N. H., March 28 and 29, for its annual get-together, featuring a tour through the Bermico Plant and a session of 8 papers on drainage and tiles. Harold Pulling, president of the chapter, presided. Lewis E. Parlin, secretary-treasurer, put out a real good newsletter, replete with an up-to-date list of members. Outstanding papers are given special recognition.



Show-Me officers and guests at St. Louis meeting in March. *L-R, bottom:* H. C. Jackson, pres.; H. W. Pritchard; Roger E. Sherman, sec'y; *(top)* D. E. Wade; Hugh Steavenson; H. J. Shade, progr. chmn., Nolan Fugua (NASCD pres.).

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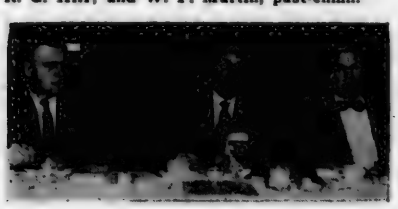
Empire State Chapter (New York), in spite of continued "blizzards and bad weather" got 50 members out for its annual meeting held on the campus of Syracuse University. Robert Walker gave a review of the summer meeting and summarized research underway on conifer plantings. The rest of the stated program included some excellent talks on forestry, with emphasis on farm woodlands and research in forestry. Floyd Carlson, James Henry and Harold G. Wilm (chrm.) served on the program committee. Chapter chairman, M. M. Weaver, presided. Reeshon Feuer, Ithaca, was elected chairman for 1958-59.

L-R: Alexander Forster, speaker; H. G. Wilm (past-chmn.) and Reeshon Feurer, chmn., Empire State Chapter.

At Minnesota Chapter meeting during NASCD convention: *L-R.* G. A. Simpson, past-sec'y; R. G. Hill; and W. P. Martin, past-chmn.



Inland Empire Chapter (Washington and Northern Idaho) sent in some newspaper clippings describing the work that Charles Thronson did to win a joint award from the chapter and the Columbia Soil Conservation district. Thronson also won the regional FFA soil and water management award at Kansas City in October, 1957. Fay A. Givan, an outstanding mem-

ber of the chapter and soil conservationist for the north Idaho Indian agency at Lapwai since 1940, died February 18.

L-R: Darley Allen, SCS, work unit conservationist, and Jesse Wyant, farmer and supervisor, Lower Yakima Valley district (both members of SCSA), examine the Inland Empire Chapter's exhibit which was shown at *SCSA* annual meeting in California. Techniques of farm and ranch planning are shown in this well-designed panel.

Wisconsin Chapter issued a March newsletter including a brief summary of the January meeting (topic: federal-aid in land-use programs); new officers for 1958; membership (300 goal) and welcome to new members (named); committees (Boy Scout committee has been most active in furnishing Scout councils with lists of agencies, persons, and materials to promote Scout conservation activities); tentative program listing for 1958 (dates, topics, places and councilman program representative); new publications released by national *Society;* and notes on members, with a listing of those serving on national committees. Ruth L. Hine is editor and Jack Densmore, Madison, is chapter chairman.

A SOUTH DAKOTA watershed model, prepared by Chapter members, was exhibited at Minneapolis during the NASCD convention. Ross Davies (S. Dak. state conservationist); I. O. Hembre (chmn., national committee on chapter activities); and Wayne Pritchard view the production.

Washington, D. C., Chapter learned of progress being made to restore to some semblance of ecological sanity the waters and soil resources of the Potomac River Basin. Ellis S. Tisdale, director of the Interstate Commission of the Potomac River Basin, was a luncheon speaker on February 27. Tisdale credited many government and private agencies in cooperating on this worthwhile and badly needed restoration work. About 70 members attended the meeting.

VISITORS TO ASHEVILLE for the *SCSA* conference in October may wish to view and study the Sunny Slope Farms (Cherokee County) near Spartanburg, South Carolina. Showing are 29 waterways, 1 water ditch, 2 ponds, 400 acres peach trees on the contour and 400 acres cover crops. This is reputedly one of the largest peach orchards in the country under such extensive contouring. Plan to include this farm and many other fine areas on your conference en route itinerary.

Charter Members of the SCSA

(Continued from the March 1958 Journal)

★ ★ ★

When the Soil Conservation Society of America was organized about 1,200 individuals, who had joined by December 31, 1945, were designated Charter Members.

It is natural that the ranks of these early members be depleted through death, illness, retirement from employment in the field, new interests or employment, or just plain procrastination or neglect in keeping up-to-date on dues payments. Charter cards are maintained by those charter members who are not delinquent in back year(s).

A recent count shows that there are now about 650 Charter Members still on the active roll of the SCSA. It is a pleasure to see these published. We hope that you will find friends on this list with whom you will wish to correspond.

Any mistakes or omissions should be called to our attention at the National office.

★ ★ ★

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McIntyre, C. L., 175 Hampton Court, Athens, Ga.
McKeever, Ivan, 4316 Crestview Rd., Harrisburg, Pa.

(To be continued)

NEWS OF MEMBERS

Jackson B. Hester announced that Henry I. Wohl, formerly head of the agricultural department of St. Martin's College, Olympia, Wash., has joined the Jackson B. Hester Agricultural Research Laboratories at Elkton, Maryland.

Durward L. Allen of the Purdue University department of forestry and conservation will direct a study on moose-wolf relationships. A $1,000 grant was received from the National Wildlife Federation for this study.

Charles Dambach at Ohio State University will direct a special seminar, partly financed by a $500 grant from the National Wildlife Federation, to bring conservationists and educators together to help solve mutual problems.

Other National Wildlife Federation grants were awarded to **Ruben L. Parson** of Johnson City ($1,000) for graduate work at Oregon State College on teaching and writing about resource education. "Rube" is author of a popular textbook on conservation, reviewed in the November, 1957, JOURNAL. And, **Belmont R. Pitkin**, Hartford, Connecticut (SCS), received a $800 grant for graduate work at the University of Michigan in basic soil classification for land-use planning.

[EDITOR'S NOTE: Society members and chapters should be aware that there are opportunities for extended studies under grants-in-aid from various organizations such as the National Wildlife Federation, Washington, D. C.]

E. J. Petersen, chief of safety and training for the SCS will present "water safety on farm ponds and private fishing lakes" at the 1958 annual convention of the Water Safety Congress to be held at the Admiral Semmes Hotel in Mobile, Ala., May 19-20. Petersen is a charter member of the *Society* and holds card No. 121.

William M. Stilwell has been appointed manager, Agricultural Sales and Development of Climax Molybdenum Company, a Division of American Climax, Inc. He replaces **George Cripps** who has joined Atlas Powder Company as food industry manager. Stilwell resides in Fanwood, N. J.

Don Williams, representative to the American Association for the Advancement of Science, reports that **Roy Hockensmith** has been elected vice-president of the Association and chairman of Section 0 (Agriculture) and **Howard B. Sprague** of Pennsylvania State University was elected secretary of the section. These men will serve during 1958.

Robert I. Turner of Spencer, Iowa, wrote to the *Society* offices stating his strong approval of the 1957 annual meeting in California . . . "the program was very good; the fellowship and attitude of the people attending was excellent; and, the quality and desirability of the conference grounds were beyond my highest expectations. The food was certainly enough to make us remember the trip."

Michael Weaver has been active in "talking tile" in New Hampshire and to the Northern New England chapter.

Clarence A. Foster of Colorado Springs is the new president of the Colorado Association of Soil Conservation Districts.

Dr. Lincoln Ellison, 49, research director for the U. S. Forest Service intermountain forest and range experiment station at Ogden, was killed in a snow avalanche while skiing at Snow Basin, Utah.

A. H. Settle of Goodyear Tire and Rubber Company, Akron, Ohio, announced the start of sixth annual soil conservation awards program to begin May 1.

Frank Neely of Des Moines, Iowa, has been appointed training supervisor of the SCS training center at Coshocton, Ohio. **Harrison Tayler** formerly in this position has accepted an ICA assignment in India.

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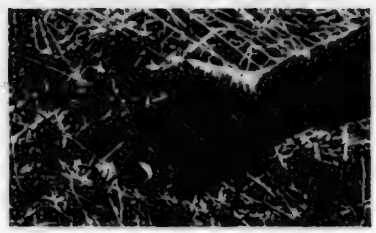

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Bemis

Luis McCaskill Pena, a new member of the Soil Conservation Society of America, is in the United States on an exchange program for one year, during which he will be given an opportunity to study and become acquainted with the soil and water conservation program of this country. This study is under the direction of the International Cooperation Administration.

Luis Pena is a graduate of the University of Chile, class of 1950, and has worked for two years as agriculturalist for the Agriculture Services of Chile, South America. He arrived in Washington, D. C. in December 1957. His first assignment in the United States was to spend one month in the American Language Center in Washington. His itinerary includes a period of six weeks with the Neshoba County Soil Conservation District, Philadelphia, Mississippi, where he is learning the principles of making farm conservation plans including the use of soil capability maps; and the application of these plans in such things as farm layout, survey and construction of ponds, terraces, drainage ditches, and other soil and water conservation practices.

This 31 year old Conservationist is scheduled to spend some time in other places, including the University of Utah, studying soils and related subjects. The rest of the year will be spent in the far West—Oregon, Washington and California —where he will receive information and training on irrigation and other phases of the overall soil and water conservation work as being done in the States.

Luis McCaskill Pena *(right)* chats with Donald McCluer, soil conservationist of Philadelphia, Mississippi, about work in Neshoba county. (Courtesy of *Neshoba Democrat.*)

George Free has been commended for the completeness of a report he gave recently at a SCS-ARS meeting in Atlantic City on slope and management practice evaluation and yield effects of contouring in New York state.

Harry Porter has a paper ready for publication on his discovery of a tall fescue plant with rhizomes. Must have been growing in damp spot.

Ev Clark of New Hartford is active in New York beekeeper activities. Keeps him in honey.

Phil Allan has suffered a coronary thrombosis and was confined to the hospital in Ithaca, N. Y., but is now home.

Max Soeth, chairman of Iowa ASC committee, has resigned and has been succeeded by **Joe Carber.**

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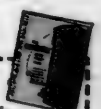

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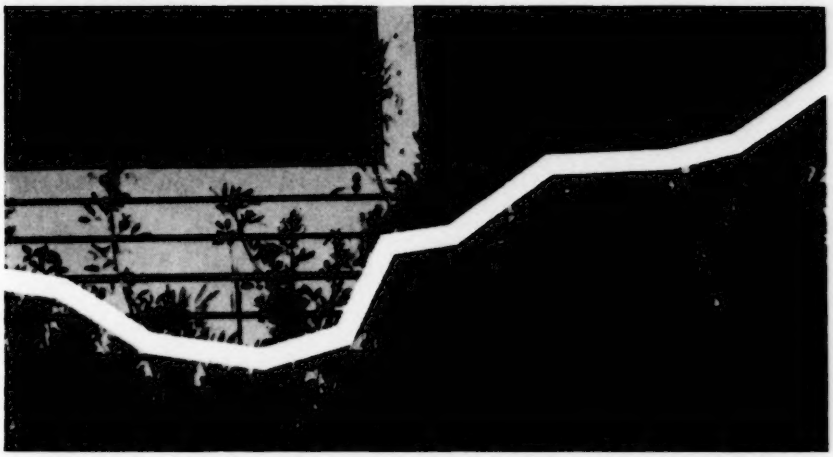

In a Washington State test, sweet clover responds to moly fertilization with yield of 1.5 tons of hay per acre (area at right). Control area (left) yielded only 0.7 ton per acre.

(Photo courtesy State College of Washington).

Average yield or high production? Moly may make the difference

Moly can give striking increases in yields, even on land farmers thought was "good enough"

During the past few years agronomists and many farmers have witnessed the dramatic upturn of crop yields when small additions of molybdenum were made to moly-starved soils. These results have been widely reported, and today the more obvious symptoms of moly-starvation are quickly recognized by most county agents.

But how about the much larger areas where moly-deficient soils might be described as undernourished rather than starved? Here moly can make the difference between average yields, average quality, average profits and high yields of premium quality crops that mean extra income.

At the present time these areas of potential response to moly treatment are known to include large parts of the eastern U.S. and much of the arable land of the Pacific Northwest. They take in many productive farms whose owners, lacking a standard of comparison, are reasonably satisfied with present yields.

In these areas, tests by experimental stations and growers alike have established that moly applications can boost yields by 12 to 93%. Although such improvements are not perhaps as spectacular as in moly-starved soils, they have already added to the profits of individual farmers. Broad-scale treatment of these undernourished soils can contribute substantially to overall farm production.

How Moly Works

A fact that has emerged from many studies of micronutrients is that moly is essential to nitrogen fixation. Legumes require moly for the fixation of atmospheric nitrogen by the bacteria in their root nodules. All crops need it to reduce nitrates to nitrogen—the first step in protein synthesis.

When there isn't enough available moly in the soil to satisfy plant requirements, crops literally starve to death (as in the case of serious, visible deficiencies), or achieve only a fraction of their potential growth (as in the case of many fields with "normal" productivity).

On the other hand, small amounts of moly have given both substantial increases in crop yields and marked improvement in quality to many farmers who were once content with fair to average production. In many cases alfalfa has a higher protein content when "normal" fields are treated with moly. Cauliflower runs to large size, more succulent flavor.

Consider the effect of moly on a typical few of the 30-odd crops for which responses have been reported:

Alfalfa—In field tests in New Jersey, Dr. Harold J. Evans of Rutgers University obtained an average increase in yield of 13%, marked improvement in protein content. In field tests in Spokane County, Washington, Dr. H. M. Reisenauer of the State College of Washington found that treating molybdenum deficient fields with moly increased yields an average of 40%.

Melons—A Virginia grower reports that with moly treatment he gets an average of 7 runners per vine with each runner bearing a large melon. Untreated plants bear fewer runners, much smaller fruit.

Peas—In eastern Washington and northern Idaho, where both dry edible and seed peas are a major crop, commercial use of moly is producing more peas per pod, more pods per vine. And vines are longer, easier to harvest. Yield increases in commercial tests have averaged 63%. Many farmers realize a return of $10 on each dollar invested in moly.

Cauliflower and Lettuce—Growers on Long Island and in upstate New York, in Rhode Island and mid-New Jersey report more vigorous cauliflower plants with heads of better quality. Color and leaf structure of lettuce improved. Yields were consistently higher than for untreated fields.

Testing is Easy

Although crops vary in their moly requirements and responses vary with soils, there is one sure way for a grower to find out whether he can increase the yield and quality of a particular crop on a particular soil: run a field test. It's easy to do.

A stock solution for such tests is made by dissolving one ounce of sodium molybdate in one gallon of water. For vegetable crops, select and mark one or more rows through the center of the field. Mix three cups of the stock solution with one gallon of water and apply to the test rows, using about a quart to a 250-foot row. Compare the test rows with untreated rows every other day. Check yields and quality against untreated areas at harvest.

For legumes, lay out a test plot 10 yards square in a location that will make it easy to compare with untreated soil. Follow the usual fertilizer plan, but do not use nitrogen on either the test plot or the control areas. Spray the test plot with three cups of stock moly solution to a gallon of water. This may be done at the time of seeding, or to an established stand. Because increases of 25% or less are difficult to evaluate visually, clipping tests should be made.

For detailed information on the handling of moly test plots write Climax Molybdenum Company, Dep't. 50, 500 Fifth Avenue, New York 36, N. Y.

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Range land from waste land—Cat Diesel Tractor and Fleco Root Plow destroy brush without turning over soil. Blade cuts trees and brush off below surface; seeder attachment re-seeds grass.

Conservation contractor, Kay Statler of Keota, Ia., is also a farmer. His D8 is shown clearing bottom land for farming. Job involved removing 200 trees and stumps from 10-acre field. He says, "I've watched others perform—I know Cat Diesel Tractors are superior."

Some of the best land on this farm was covered with trees here at Silver Springs Gardens, Inc., Eau Claire, Wis. A D6 is shown here pushing out stumps and clearing. It has also built 8 miles of dikes to protect this new 1,000 acres of peat land which is being cleared and drained for growing horse-radish.

FREE LITERATURE

New Booklets: "LAND CLEARING"—describes efficient land clearing methods; "THE ROAD AHEAD"—explains the Interstate-Defense Highway Program. Write Dept. JS58, Caterpillar Tractor Co., Peoria, Ill., U.S.A.

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